Operation Manual for AS380S Series Elevator Integrated Drive Controller

Publication status: Standard

Version: V2.00

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I. Foreword

AS380S series elevator integrated drive controller is the new generation of integrated elevator drive control device designed by Shanghai STEP Electric Corporation. The system uses the modular design, base block (no output contactor arcing), downloadable fault record, no stopping to reduce the running performance after overheating, balance coefficient self-learning, guided debugging and other functions; mating parameter setup may realize the optional functions of electric brake release and No. 2 band brake output. Handsome removable panel is well designed; both middle and bottom installations are available. In addition, it has advantages of safety, reliability, complete function, good speed governing performance, easy operation and others. This manual is a brief operating introduction of this integrated controller and can be used as a reference for technicians in model selection, design, commissioning and repair. For more detailed knowledge and information on AS380S series elevator integrated drive controller, you can visit our website www.stepelectric.com to read or download the "Operation instructions for AS380S series elevator integrated drive controller". Users may also contact our related department to request the CD or paper document of "Operation instructions for AS380S series elevator integrated drive controller".

II. Model, technical indicators and specifications of integrated drive controller

The model of AS380S series integrated drive controller is illustrated as follows.

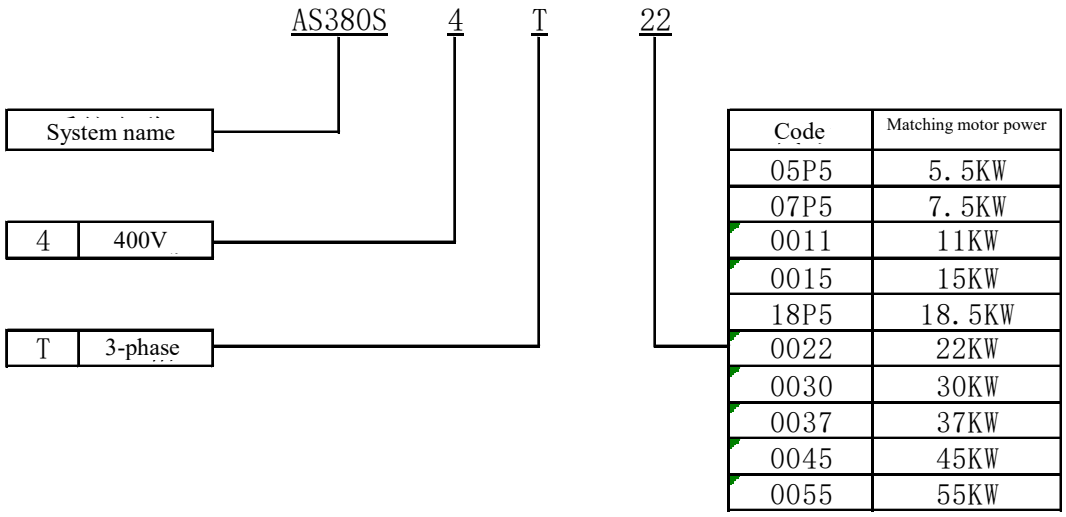


Figure 2.1 Model description of elevator integrated drive controller

The models of AS380S series integrated drive controller are shown in the following table.

Table 2.1 Models of AS380S series integrated drive controller

型号 AS380S-	额定容量（kVA）	额定输入电流（A）	额定输出电流（A）	适配电机功率（kW）
4T05P5	8.5	13.8	13	5.5
4T07P5	12	19	18	7.5
4T0011	18	28.5	27	11
4T0015	22	36	34	15
4T18P5	27	43	41	18.5
4T0022	32	50	48	22
4T0030	43	66	65	30
4T0037	53	81	80	37
4T0045	64	100	97	45
4T0055	84	132	128	55

The following table shows the technical indicators and specifications of AS380S series integrated drive controller.

Table 2.2 Technical indicators and specifications of AS380S series elevator integrated drive controller

Technical indicators		Specifications									
Model		**4T05 P5**	**4T07 P5**	**4T00 11**	**4T00 15**	**4T18 P5**	**4T00 22**	**4T00 30**	**4T00 37**	**4T00 45**	**4T00 55**
Max applicable motor capacity (kW)		5.5	7.5	11	15	18.5	22	30	37	45	55
Rated output	Rated capacity (kVA)	8.5	12	18	22	27	32	43	53	63	84
	Rated current (A)	13	18	27	34	41	48	65	80	97	128
	Max output voltage (V) and range	400V Class: AC400V Range: 0~input voltage									
Input power supply	Input voltage range	400V Class: AC340V~AC440V									
	Input frequency and allowable fluctuation	50/60Hz; -5%～+5%									
	Number of phases	400V Class: 3-phase									
Basic characteristics	Max accessible floor	2-64 floors for single elevator									
	Elevator running speed	≤2.5m/s									
	Units under group control	≤8									
	Communication mode	CAN bus serial communication									
	Operation function	See 3.1 for product function list									
Drive characteristics	Control mode	Vector control with PG card									
	Startup torque	150% 0Hz (vector control with PG card)									
	Speed governing range	1:1000 (vector control with PG card)									
	Speed governing precision	±0.02% (vector control with PG card, 25±10℃)									
	Torque limit	Yes (set with parameters)									
	Torque precision	±5%									
	Frequency control range (Output frequency range)	0～120Hz									
	Frequency precision (temperature fluctuation)	±0.1%									
	Frequency setting resolution	±0.06Hz/120Hz									
	Output frequency resolution (calculation resolution)	0.01Hz									
	No-load startup compensation	When the elevator load is unknown, suitable torque will, as per the ready-to-travel direction of elevator, be applied on motor so as to ensure smooth start of elevator, minimize the slipping and improve comfort at starting moment.									
	Overload capacity	150% at zero speed, 160% if < 3Hz, 200% if > 3Hz									

Technical indicators		Specifications
	Brake torque	150% (external braking resistor), built-in braking unit
	Acceleration/deceleration time	0.01～600s
	Carrier frequency	4kHz～12kHz adjustable
	Battery operation	In case of blackout, the battery instantaneously supplies power to elevator for leveling at low speed
PG card interface signal	PG card output power supply	5V, 12V, 300mA
	PG card type	Open collector, push-pull, differential, SIN/COS, Endat absolute type
Control input Output signal	Opt-coupler input control power supply	Isolated 24V DC
	Relay output control power supply	Isolated 24V DC
	Low-voltage opt-coupler isolated input	28channels. Digital signal. Opt-coupler control signal is isolated 24V DC power supply input signal.
	High-voltage opt-coupler isolated input	4 channels. Digital signal.
	Relay output 1	5 channels. NO contact, single-pole and single-throw, contact capacity: resistive, 5A 250VAC or 5A 30VDC
	Relay output 2	3 channels. NO contact, single-pole and single-throw, contact capacity: resistive, 6A 250VAC
	CAN communication interface	3 channels (parallel or group control, communication between car and outside, community monitoring)
	Analog input port	1 channel. Single end or differential input, input voltage range -10V～+10V, precision 0.1%
Protection	Motor overload protection	The protection curve of motor may be set with parameters
	Converter overload protection	160% if < 3Hz, 5 s; 185% if > 3Hz, 10 s
	Short circuit protection	Provide protection to drive controller when overcurrent occurs to any two phases at output side
	In-service input open-phase protection	In case of input open-phase during operation, cut off output to protect the drive controller
	In-service output open-phase protection	In case of output open-phase during operation, cut off output to protect the drive controller
	Overvoltage threshold	Busbar voltage 410V (200V series), 810V (400V series)
	Undervoltage threshold	Busbar voltage 180V (200V series), 380V (400V series)
	Instantaneous blackout compensation	15ms-above protection
	Heat sink overheat	Protection through the thermistor
	Anti-stall	Anti-stall protection launched when running speed deviation more than 30% of the rated speed
	Impulse encoder failure	PG disconnection
	Brake unit protection	Protection launched when abnormal condition of brake unit is detected automatically
	Module protection	Protection against overcurrent, short circuit and overheating
	Current sensor protection	Self-inspection when power is connected
	Speed reversal protection	Inspection through encoder
	I^2t protection	Inspection through 3-phase current
	Protection against extremely high input voltage	> 725V for 400V Class, > 360V for 200V Class, stop and inspect
	Output ground protection	In case of short circuit of any phase to ground during operation, cut off output and protect the frequency converter
	Output imbalance protection	In case that output 3-phase current imbalance is detected during operation, cut off output and protect the frequency converter
	Brake resistor short circuit protection	Inspection in case of braking
	Encoder interference	Evaluate the degree of interference of encoder and alarm
	Over-speed protection	Protection launched when exceeding rated speed by 100%

Technical indicators		Specifications
	Low-speed protection	Protection launched when the elevator running speed is far lower than the rated speed due to some reasons including failures
	Running time limiter protection	Protection launched when floor passing time exceeds the required time
	Leveling switch fault protection	Protection launched when leveling switch is at fault
	EEPROM fault	Self-inspection when power is connected
Display	LCD in Chinese and English	Menus at each level
Environment	Ambient temperature	-10～+45℃
	Humidity	Below 90%RH (No condensation)
	Storage temperature	-20～+60℃ (temperature allowable during short-term transport)
	Application place	Indoor, fixed installation (place free of corrosive gas, dust, conductive pollutants)
	Altitude	Below 1000m
Structure	Degree of protection	IP20
	Cooling mode	Forced air cooling
Installation mode		In-cabinet installation

III. Appearance and Installation

3.1 Appearance and installation dimensions

The following gives the appearance, installation dimensions and mass of AS380S integrated drive controller.

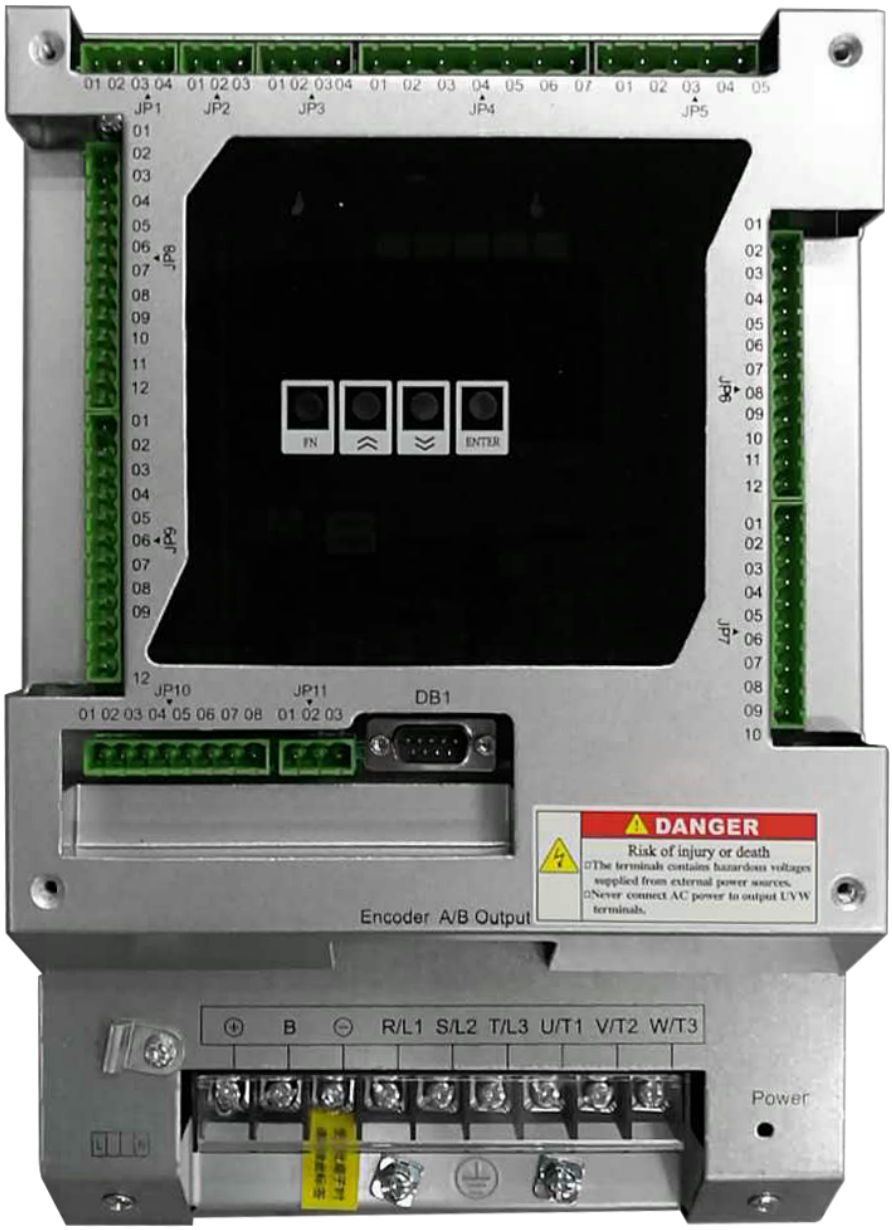


Figure 3.1 Front view of AS380S elevator integrated drive controller5.5-22KW

Figure 3.2 Front view of AS380S elevator integrated drive controller30-55KW

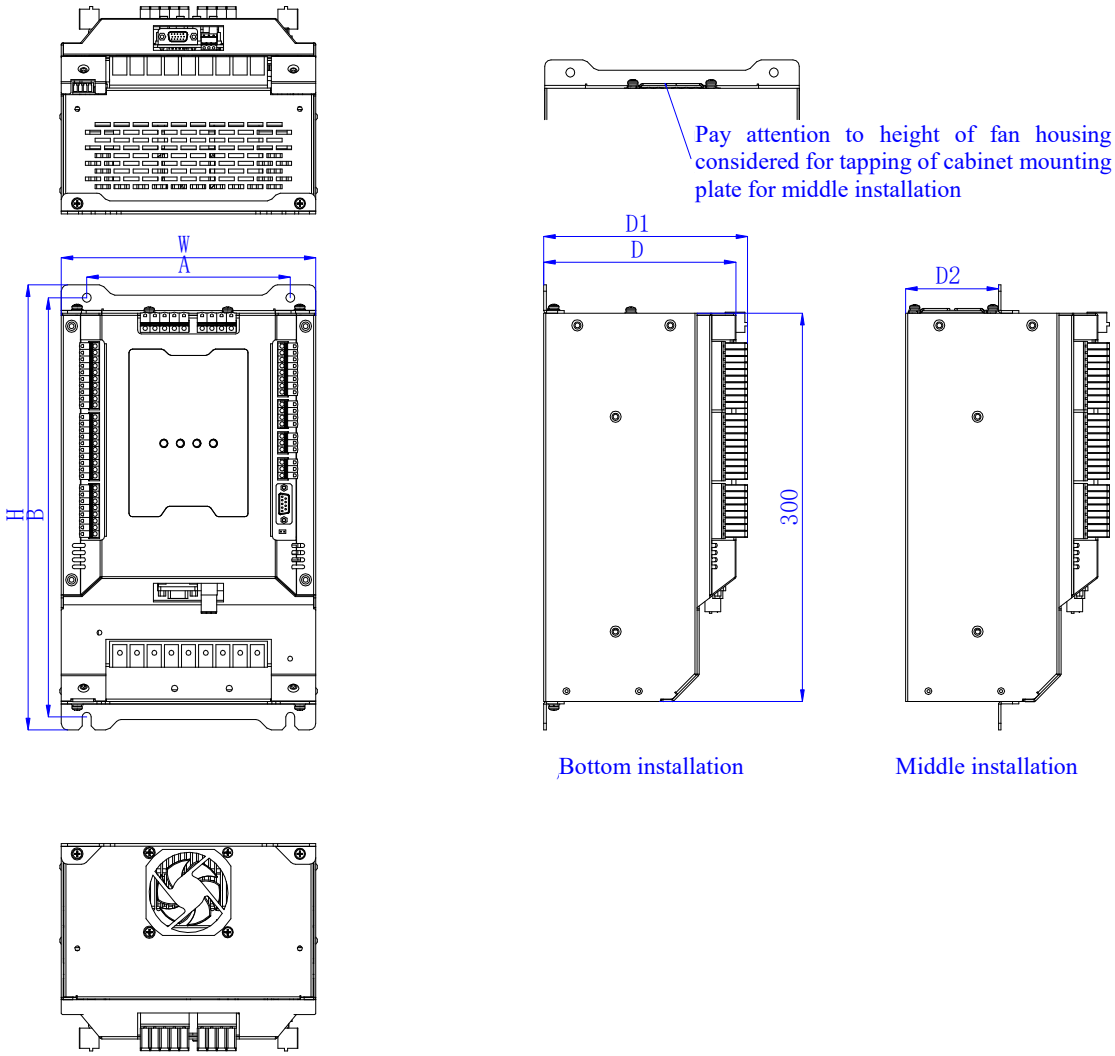


Figure 3.2 Schematic for installation dimensions of AS380S elevator integrated drive controller

Table 3.1 Installation dimensions and mass specifications for AS380S 5.5-55kW, mm

AS380S-	A	B	H	W	D	D1	D2	Mounting hole diameter φ	Installation			Fastening torque (Nm)	Mass
									Bolt	Nut	Washer		
4T05P5S	160	324	344	200	151	160.22	73	7	4M6	4M6	4φ6	3	6.1
4T07P5S													6.2
4T0011S		341	361										7
4T0015S													7.2
4T18P5S													7.6
4T0022S													
4T0030S	200	512	547	330	151	160.22	157.5	7	4M6	4M6	4 ϕ 6	3	34
4T0037S													34
4T0045S		585	620		283.5	308	143.5	10	4M8	4M8	4 ϕ 8		45
4T0055S													45

Note: D1 is the thickness size for bottom installation and D2 for middle installation.

3.2 Notices to product installation

3.3.1 Product installation location

The place where the elevator integrated drive controller will be installed shall meet such conditions as follows:

a) Installed at where there is no oily mist, dust but clean, or in the fully enclosed cabinet where suspended matters can't enter.

b) No possibility of metal powder, oil, water or others entering the inside of elevator integrated drive controller.

c) Free of timbers and other combustibles.

d) Free of radioactive substances.

e) Free of hazardous gases or liquids.

f) Low vibration.

g) Little salt.

h) Away from direct sunlight.

i) Temperature rise is as low as possible.

j) When installed in an enclosed cabinet, suitable cooling fans or air conditioners should be provided to keep the ambient temperature under 40℃.

3.3.2 Product installation orientation and clearance requirements

To avoid impairing the cooling effect of elevator integrated drive controller, this product shall be installed at a well-ventilated place. In general, it is vertically installed with suitable clearances as required in the following figure.

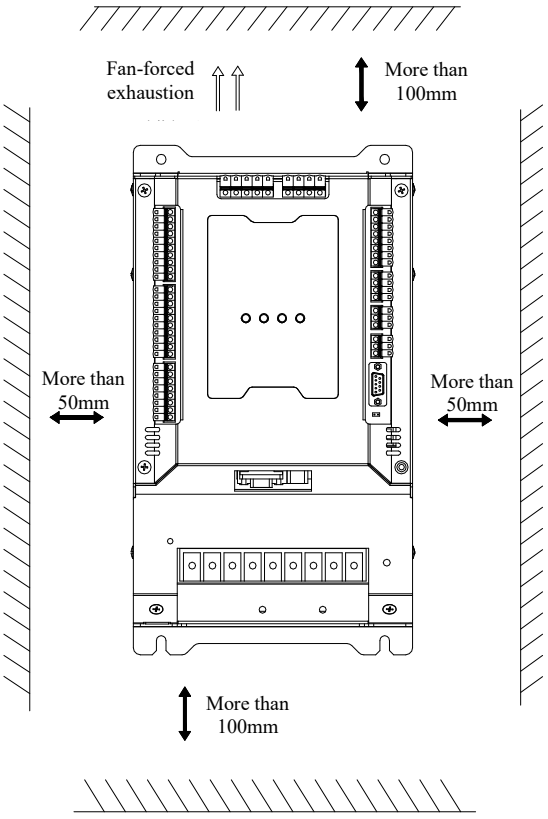


Figure 3.3 Requirement for installation clearance

IV. Terminal Block Definitions of Elevator Integrated Drive Controller

4.1 System structure

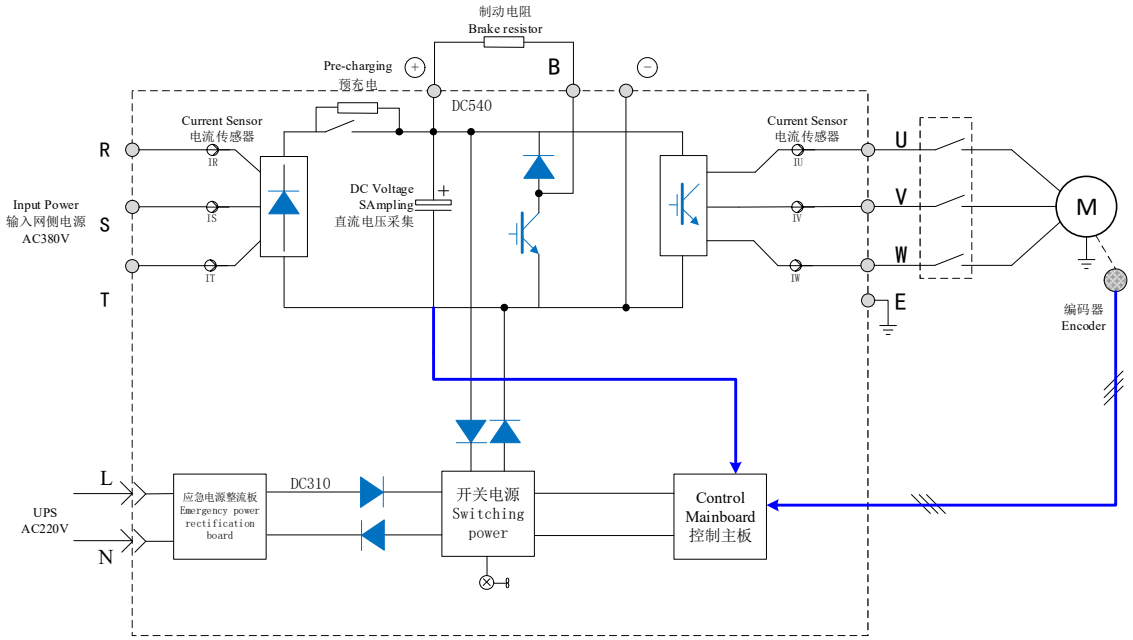


Figure 4.1 Main circuit system structure of AS380S controller

4.2 Description of main circuit terminal block

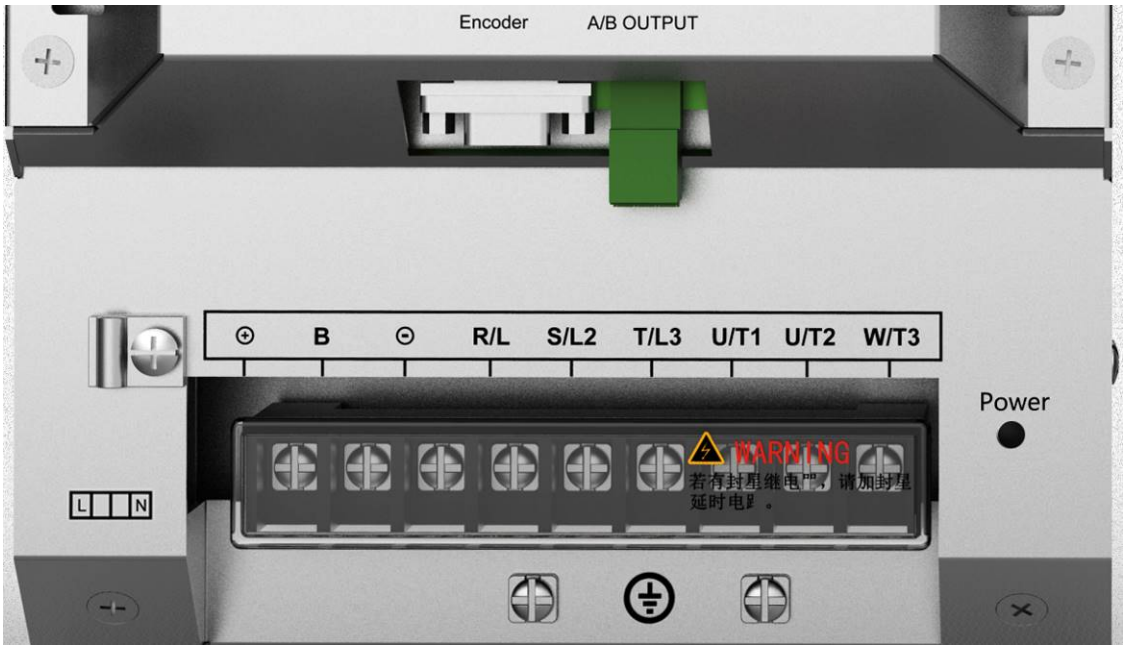


Figure 4.2 Layout of main circuit terminals

Table 4.1 Definitions of main circuit ports

Terminal label	Port definition
⊕	External brake resistor connection
B	
⊖	DC busbar negative output terminal
R/L1	Main circuit AC power input, connected to 3-phase input power supply
S/L2	
T/L3	
U/T1	Frequency converter output, connected to 3-phase synchronous/asynchronous motor
V/T2	
W/T3	
L	AC220V emergency power supply input
N	
⏚	Ground

4.2 Description of control circuit terminal block

4.2.1 Layout of control circuit terminals

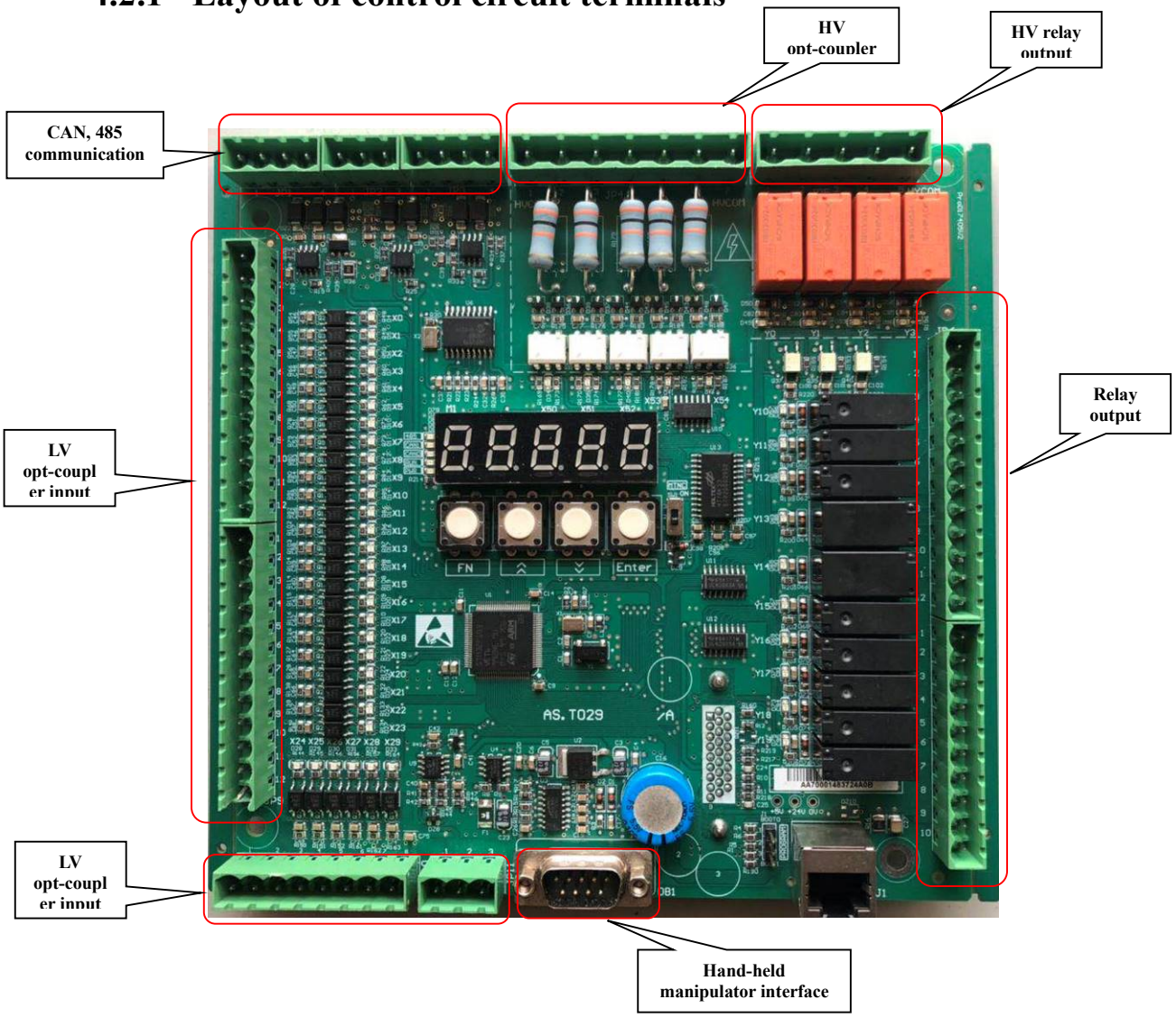


Figure 4.3 Control circuit terminals

The layout of control circuit terminals is shown in the above figure.

4.2.2 Definitions of control circuit ports

The functional description of control circuit terminals is given in the following table.

Table 4.2 Functional description of control circuit terminals

S.N.	Location	Screen printing	Definition	Type	Remark
JP1	1	GND	Command, hall call communication 0V		
	2	CANH0	Command, hall call communication CANH, TXA0+		
	3	CANL0	Command, hall call communication CANL, TXA0-		
	4	ADDMODE	Hall call address self-learning		
JP2	1	GND	Parallel, group control communication 0V		
	2	CANH1	Parallel, group control communication CANH, TXA1+		
	3	CANL1	Parallel, group control communication CANL, TXA1-		
JP3	1	GND	Parallel, group control communication 0V		
	2	CANH1	Parallel, group control communication CANH, TXA1+,485A+		
	3	CANL1	Parallel, group control communication CANL, TXA1-,485B-		
JP4	1	HVCOM	AC110VL high-voltage input common port		
	2	X50	Safety circuit, AC110VN	High-voltage input	
	3	X51	Door lock circuit, AC110VN	High-voltage input	
	4	X52	Hall door lock circuit, AC110VN	High-voltage input	
	5	X53	All door lock circuit, AC110VN	High-voltage input	
	6	X54	spare	High-voltage input	
	7	HVCOM	AC110VL high-voltage input common port		
JP5	1	Y0	Band brake output 1	High-voltage output	
	2	Y1	Band brake output 2	High-voltage output	
	3	Y2	Band brake forced excitation output	High-voltage output	
	4	Y3	Main contactor output		
	5	YCOM1	Output common port Y1-Y3		
JP6	1	Y10	Delayed star output		
	2	Y10COM	Output common port Y10		
	3	Y11	Door pre-opening output	Low-voltage output	
	4	Y11COM	Output common port Y11		
	5	Y12	Blackout emergency leveling output	Low-voltage output	
	6	Y12COM	Output common port Y12		
	7	Y13NO	Firefighting signal NO output 1	NO low-voltage output	Y13 May be redefined
	8	Y13NC	Firefighting signal NC output 2	NC low-voltage output	
	9	Y13COM	Output common port Y13		
	10	Y14NO	Spare		

S.N.	Location	Screen printing	Definition	Type	Remark
	11	Y14NC	Spare		
	12	Y14COM	Output common port Y14		
JP7	1	Y15	Spare		
	2	Y15COM	Output common port		
	3	Y16	Spare		
	4	Y16COM	Output common port		
	5	Y17	Spare		
	6	Y17COM	Output common port		
	7	Y18	Spare		
	8	Y18COM	Output common port		
	9	Y19	Spare		
	10	Y19COM	Output common port		
JP8	1	X0	Inspection 1; disconnected as inspection, both X0 and X1 connected as auto	Low-voltage input	
	2	X1	Inspection 2; disconnected as inspection, both X0 and X1 connected as auto	Low-voltage input	
	3	X2	UP; inspection: inching UP; attendant: UP and change direction	Low-voltage input	
	4	X3	DOWN; inspection: inching DOWN; attendant: DOWN and change direction	Low-voltage input	
	5	X4	No. 1 terminal deceleration switch	Low-voltage input	
	6	X5	No. 2 terminal deceleration	Low-voltage input	
	7	X6	Upper leveling switch	Low-voltage input	
	8	X7	Lower leveling switch	Low-voltage input	
	9	X8	Main contactor inspection	Low-voltage input	
	10	X9	Band brake contactor detection	Low-voltage input	
	11	X10	Left band brake switch detection	Low-voltage input	
	12	X11	Right band brake switch detection	Low-voltage input	
JP9	1	X12	Motor temperature inspection	Low-voltage input	
	2	X13	Door pre-opening relay inspection	Low-voltage input	
	3	X14	Door zone signal inspection	Low-voltage input	
	4	X15	Firefight return/firemen switch	Low-voltage input	May be redefined
	5	X16	Blackout emergency leveling input / backup power supply	Low-voltage input	
	6	X17	Door lock relay inspection	Low-voltage input	
	7	X18	UP No. 2 terminal deceleration	Low-voltage input	
	8	X19	DOWN No. 2 terminal deceleration	Low-voltage input	
	9	X20	Band brake contactor detection 2	Low-voltage input	May be redefined
	10	X21	Delayed star contactor detection	Low-voltage input	
	11	X22	Door bypass detection	Low-voltage input	
	12	X23	Spare	Low-voltage input	
JP10	1	X24	Spare	Low-voltage input	
	2	X25	Spare	Low-voltage input	
	3	X26	Spare	Low-voltage input	
	4	X27	Spare	Low-voltage input	
	5	X29	Base blockade	Low-voltage input	

S.N.	Location	Screen printing	Definition	Type	Remark
	6	DC24V	Switching power supply 24V (powering the opt-coupler)	Opt-coupler input common port; When JP9.7 is short connected to JP9.6 externally, JP9.8 is input common port, and at this point input is effective at low level; When JP9.7 is short connected to JP9.8 externally, JP9.6 is input common port, and at this point input is effective at high level	
	7	VCOM	Input common port X1-X29		
	8	DC0V	Switching power supply DC0V (powering the opt-coupler)		
JP11	1	0V	0V		
	2	AIN-	Differential analog input -		
	3	AIN+	Differential analog input +		
DB1			Hard connection to drive realized: Main control board power supply; UART communication; encoder; high-voltage relay enabled		

Note: For input and output points that may be redefined, they may be redefined as the functions given in the following table.

Table 4.3 List of port redefinitions

Input port redefinition			Output port redefinition		
Value	**Definition**	**Remark**	**Value**	**Definition**	**Remark**
0	Emergency leveling		0	Low-speed output	
1	Earthquake		1	Fan output	
2	Backup power supply		2	UP	
3	Overload		3	DOWN	
4	Full load		4	Door lock	
5	Light load		5	Door zone	
6	Fireman		6	Front door open	
7	Elevator locking		7	Front door close	
8	Self-learning		8	Rear door open	
9	Delayed star inspection		9	Rear door close	
10	Standby		10	Non-door-zone stopping	
11	Fire return		11	Fault	
12	UP deceleration 3		12	Running	
13	DOWN deceleration 3		13	Emergency leveling	
14	UP deceleration 4		14	Emergency leveling completed	
15	DOWN deceleration 4		15	Firefighting	
16	Upper limit		16	Electromagnetic cam	
17	Lower limit		17	Door pre-opening	
18	UP deceleration 2		18	Delayed star contactor	
19	DOWN deceleration 2		19	Electric brake release	When electric brake release has input, output will be kept always; Except following 3 circumstances: where elevator stops in the door zone, or it reaches the leveling

Input port redefinition			Output port redefinition		
Value	**Definition**	**Remark**	**Value**	**Definition**	**Remark**
					zone, or speed is more than 0.3m/s
20	Door pre-opening inspection		20	No. 2 band brake	Output at ordinary times, disconnect with 2s delay after failure to stop the elevator
21	Door zone inspection				
22	Electric brake release	When there is input at this point, electric brake release gives output; If no such definition is given at the input point, electric brake release input always valid is defaulted			

4.3 Description of PG cards

PG cards have following types to adapt to different kinds of encoders. See the following table.

Table 4.4 PG card configuration

PG card type	Motor type	Model	Input signal	Output power supply	Frequency dividing output
SIN/COS type	Synchronous	AS.L06/U	SIN/COS differential signal	5V, 300mA	Without frequency dividing output itself, with external frequency dividing debug board to output OA, OB orthogonal, frequency dividing coefficients 1~128
ABZ incremental 12V	Asynchronous/ synchronous	AS.L06/V.01	Open collector signal Push-pull signal Differential signal	5V, 300mA	
ABZ incremental 5V	Asynchronous/ synchronous	AS.L06/V.02		12V，300mA	
Endat absolute	Synchronous	AS.L06/W	Endat signal	5V, 300mA	

4.3.1 AS.L06/U (SIN/COS PG card)

AS.L06/U is used to receive the SIN/COS differential output signal from encoder.

Function: Convert the analog signal containing position and speed messages sensed and output by sine-cosine encoder to digital square wave and analog signal received easily by corresponding external module of micro controller unit. Improve the position and speed measuring accuracy, and enhance the immunity to interference of encoder transmitted signal.

Advantage:

1) Strong immunity to interference. Utilize the hysteresis band of hysteresis comparator to inhibit the interference of low amplitude near the comparison point so as to improve the immunity to interference of sine-cosine encoder transmitted signal.

2) Excellent dynamic response. The signal transmission bandwidth is increased as much as possible.

Scope of application: AS380S integrated controller, AS380D split-type integrated controller

4.3.2.1 Physical picture

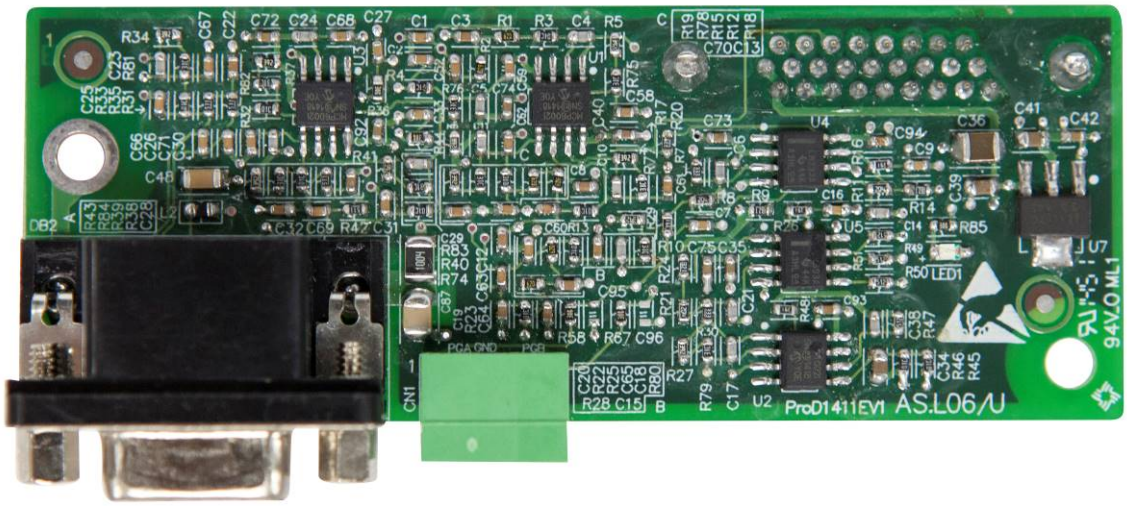


Figure 4.4 AS.L06/U front view

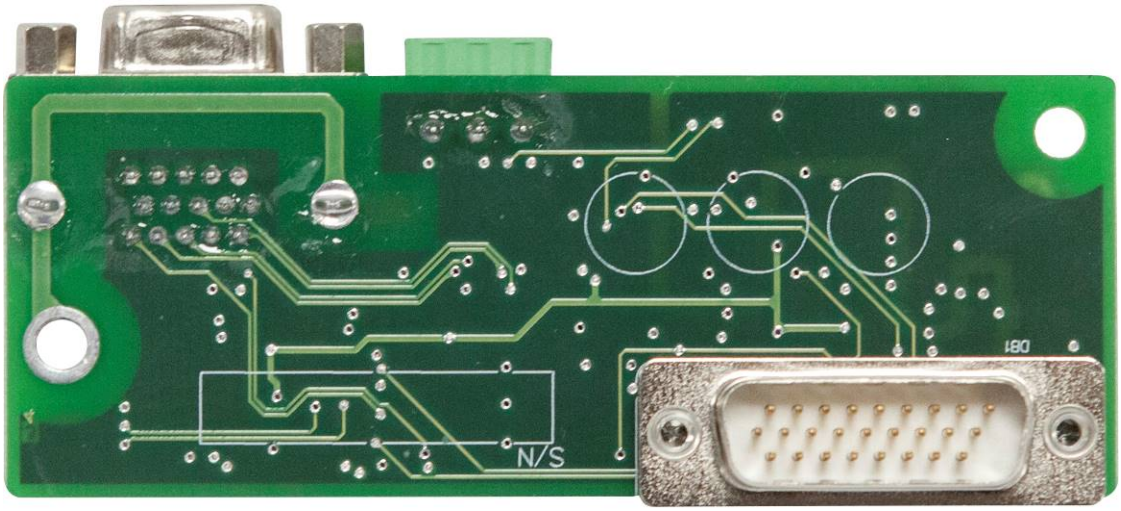


Figure 4.5 AS.L06/U back view

4.3.2.2 Port labels and definitions

The DB2 port is the connection port of PG card and encoder, which is defined in the following table.

Table 4.5 Definition of DB2 port

Name	Terminal label	Terminal function description	Specifications
DB 2 (15 pins) Encoder input	C+, C-	Encoder synchronizing signal	Differential signal, maximum input frequency 20kHz
	D+, D-	Encoder synchronizing signal	
	R+, R-	Encoder Z signal	Differential signal, maximum input frequency 70kHz
	SIN+/-	Encoder SIN signal	
	COS+/-	Encoder COS signal	
	+5V	+5V	Voltage 5VD, maximum output current 250mA
	GND	+5V GND	

The physical layout of DB2 terminal labels is shown in the following table:

Table 4.6 Layout of DB2 (15 pins, board front) three-row female ports

Pin	1	2	3	4	5
Name	COS-		R+	R-	SIN+
Pin	6	7	8	9	10
Name	SIN-	GND	COS+	+5V	C-
Pin	11	12	13	14	15
Name	C+	D+	D-		

DB1 is the connection port of PG card and drive board, which is arranged as given in the following table:

Table 4.7 Layout of DB1 (26 pins, board back) three-row male ports

Pin	1	2	3	4	5	6	7	8	9
Name	+5V	+24V	+24V	SCK	MOSI	GND	SPICS		+24VIO
Pin	10	11	12	13	14	15	16	17	18
Name	+5V	GND	GND	GND	GND	NSS	MISO		COM
Pin	19	20	21	22	23	24	25	26	
Name	REFD	REFC	COS	SIN	QEP3	QEP2	QEP1		

CN1 is encoder signal output port, which is defined as shown in the following table:

Table 4.8 CN1 encoder signal output

Pin	1	2	3
Name	A	GND	B

Note: CN1 realizes the isolation function.

4.3.2 AS.L06/V (ABZ incremental PG card)

AS.L06/V may receive the output signals from three kinds of encoders, i.e., configurable open collector signal, push-pull signal and differential signal.

Notice to type selection: If ticked on the right side of AS.L06/V.01 in the physical picture screen printing, indicate the 12V ABZ incremental PG card; if ticked on the right side of AS.L06/V.02 in the physical picture screen printing, indicate the 5V ABZ incremental PG card.

4.3.2.1 Physical picture

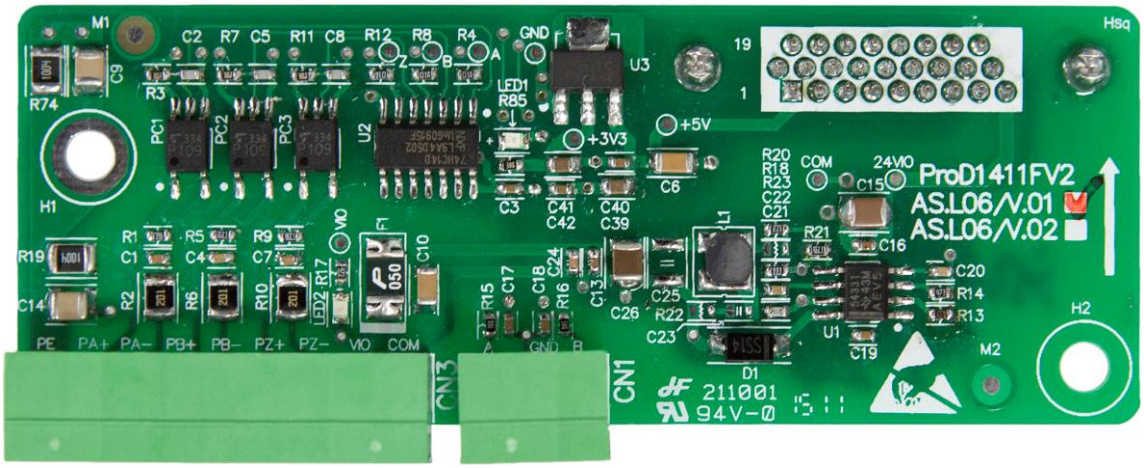


Figure 4.6 AS.L06/V front view

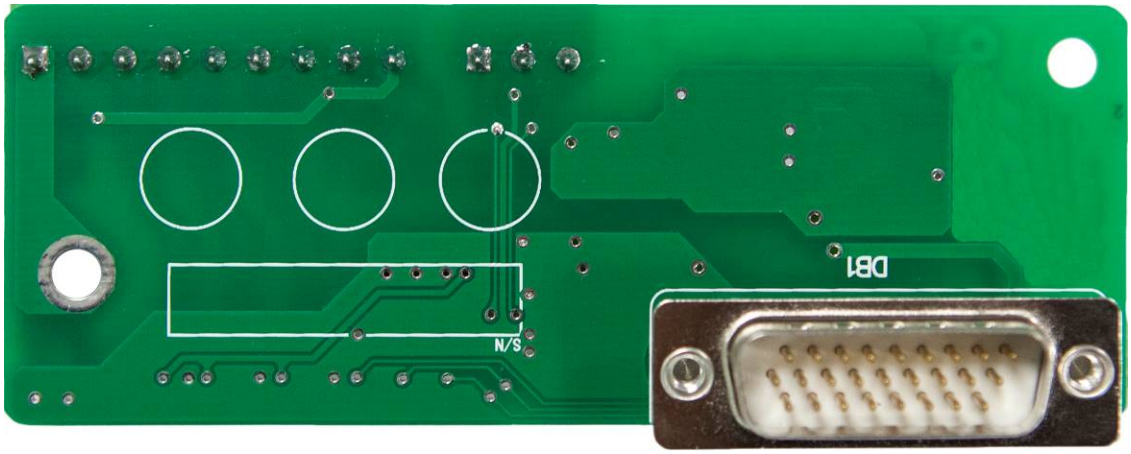


Figure 4.7 AS.L06/V back view

4.3.2.2 Port labels and definitions

The CN3 port is the connection port of PG card and encoder, which is defined in the following table.

Table 4.9 Definition of CN3 port

Name	Pin no.	Terminal label	Terminal function description	Specifications
CN3 Encoder input	CN3.1	PE	Shield grounding	Shielded wire ground terminal
	CN3.2	A+	Encoder phase A signal +	AS.L06/V.01 12V: Open collector/push-pull, maximum input frequency 100kHz AS.L06/V.02 5V: Open collector/push-pull/differential, maximum input frequency 100kHz
	CN3.3	A-	Encoder phase A signal -	
	CN3.4	B+	Encoder phase B signal +	
	CN3.5	B-	Encoder phase B signal -	
	CN3.6	Z+	Encoder phase Z signal +	
	CN3.7	Z-	Encoder phase Z signal -	
	CN3.8	VIO(+)	Encoder power supply positive pole	Maximum output current 300mA; Output voltage: DC12V (AS.L06/V.01); DC5V (AS.L06/V.02)
	CN3.9	COM	Encoder power supply negative pole	

The physical layout of CN3 terminal labels is shown in the following table:

Table 4.10 Layout of CN3 port

Pin	1	2	3	4	5	6	7	8	9
Name	PE	A+	A-	B+	B-	Z+	Z-	VIO(+)	COM

Table 4.11 DB1 (26 pins, board back) three-row male ports

Pin	1	2	3	4	5	6	7	8	9
Name	+5V	+24V	+24V	SCK	MOSI	GND	SPICS		+24VIO
Pin	10	11	12	13	14	15	16	17	18
Name	+5V	GND	GND	GND	GND	NSS	MISO		COM
Pin	19	20	21	22	23	24	25	26	
Name	REFD	REFC	COS	SIN	QEPZ	QEPB	QEPA		

Table 4.12 CN1 encoder signal output

Pin	1	2	3
Name	A	GND	B

Note: CN1 realizes the isolation function.

4.3.2.3 Input terminal and wiring for encoder output signal

ABZ incremental PG card may receive the output signals from two types of encoders: open collector

signal and push-pull signal.

The wiring for encoder open collector signal sees the following figure.

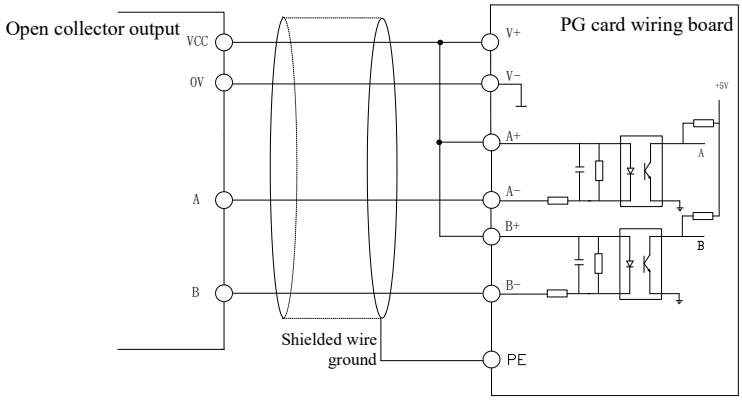


Figure 4.8 Wiring for encoder open collector signal

The wiring for encoder push-pull signal sees the following figure.

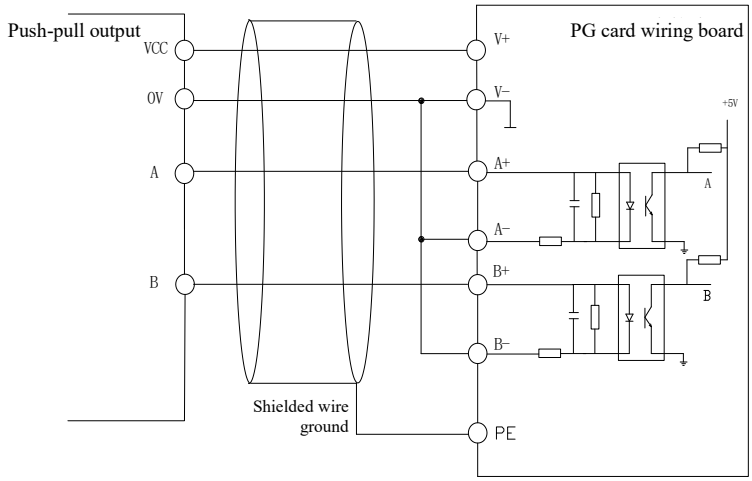


Figure 4.9 Wiring for encoder push-pull signal

4.3.3 AS.L06/W (Endat absolute type PG card)

AS.L06/W may receive the Endat output signal from encoder or be equipped with the encoder providing the Endat output signal, e.g., Heidenhain type 1313 or 413 encoder.

4.3.3.1 Physical picture

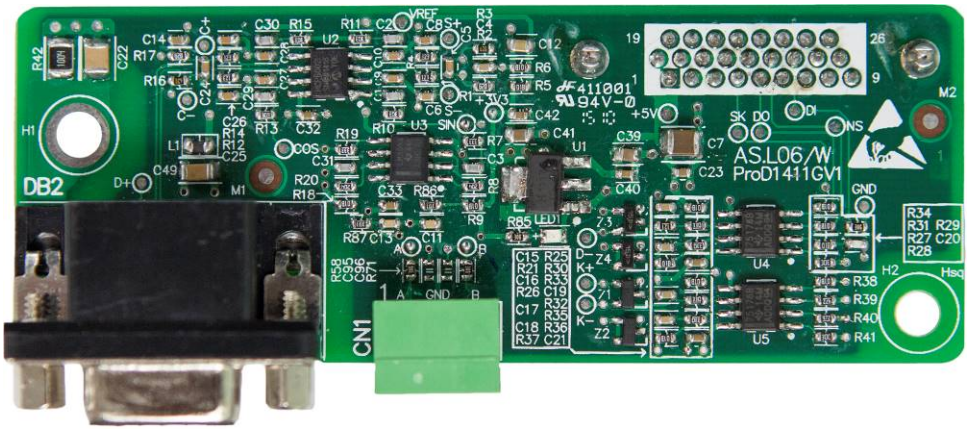


Figure 4.10 AS.L06/W front view

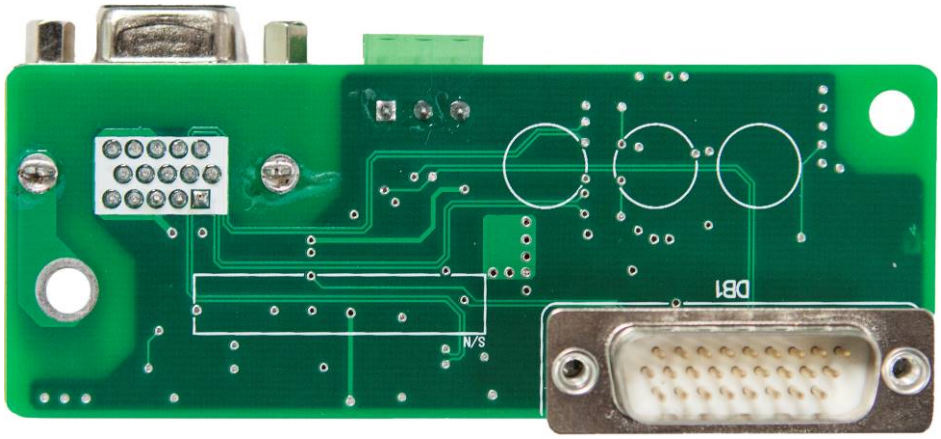


Figure 4.11 AS.L06/W back view

4.3.3.2 Port labels and definitions

The DB2 port is the connection port of PG card and encoder, which is defined in the following table.

Table 4.13 Definition of DB2 port

Name	Terminal label	Terminal function description	Specifications
Encoder input	A+, A- (SIN+, SIN-)	Encoder phase A signal	Differential signal, maximum input frequency 100kHz
	B+, B- (CON+, CON-)	Encoder phase B signal	
	C+, C-	Encoder time clock signal	
	D+, D-	Encoder data signal	
	V+	+5V	Voltage 5VD, maximum output current 200mA
	0V	+5V GND	

The physical layout of DB2 terminal labels is shown in the following table:

Table 4.14 Layout of DB2 (15 pins, board front) three-row female ports

Pin	1	2	3	4	5
Name	SIN+	SIN-	COS+	COS-	DAT+
Pin	6	7	8	9	10
Name	DAT-				
Pin	11	12	13	14	15
Name	CLK+	CLK-	+V(5V)	0V	

Table 4.15 Layout of DB1 (26 pins, board back) three-row male ports

Pin	1	2	3	4	5	6	7	8	9
Name	+5V	+24V	+24V	SCK	MOSI	GND	SPICS		+24VIO
Pin	10	11	12	13	14	15	16	17	18
Name	+5V	GND	GND	GND	GND	NSS	MISO		COM
Pin	19	20	21	22	23	24	25	26	
Name	REFD	REFC	COS	SIN	QEP3	QEP2	QEP1		

CN1 is encoder signal output port, which is defined as shown in the following table:

Table 4.16 CN1 encoder signal output

Pin	1	2	3
Name	QEP1	GND	QEP2

Note: CN1 realizes the isolation function.

4.3.4 Precautions to PG card terminal wiring

Important

Encoder signal line must be arranged separately with main circuit and other power lines. Do not arrange the lines in close parallel. Shielded wires shall be used for encoder wiring, and their shielding layers are clipped onto the casing earthing PE.

V. Description of main supported control boards of integrated drive controller

5.1 Description of car roof control board SM.02/H

5.1.1 Outline drawing and installation dimensions of car roof control board SM.02/H

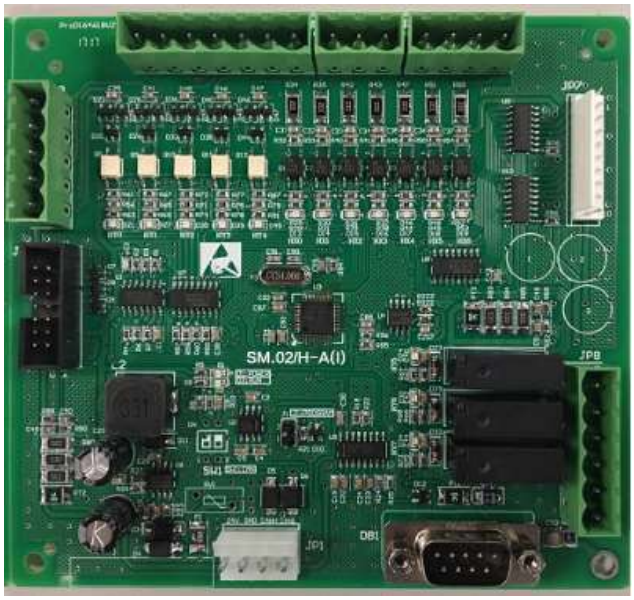


Figure 5.1 Outline drawing of car roof control board

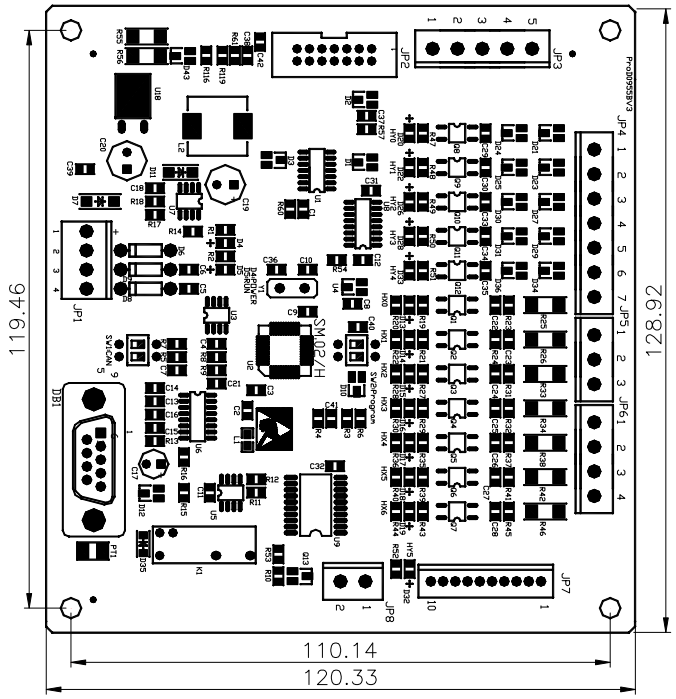


Figure 5.2 Installation dimensions of car roof control board

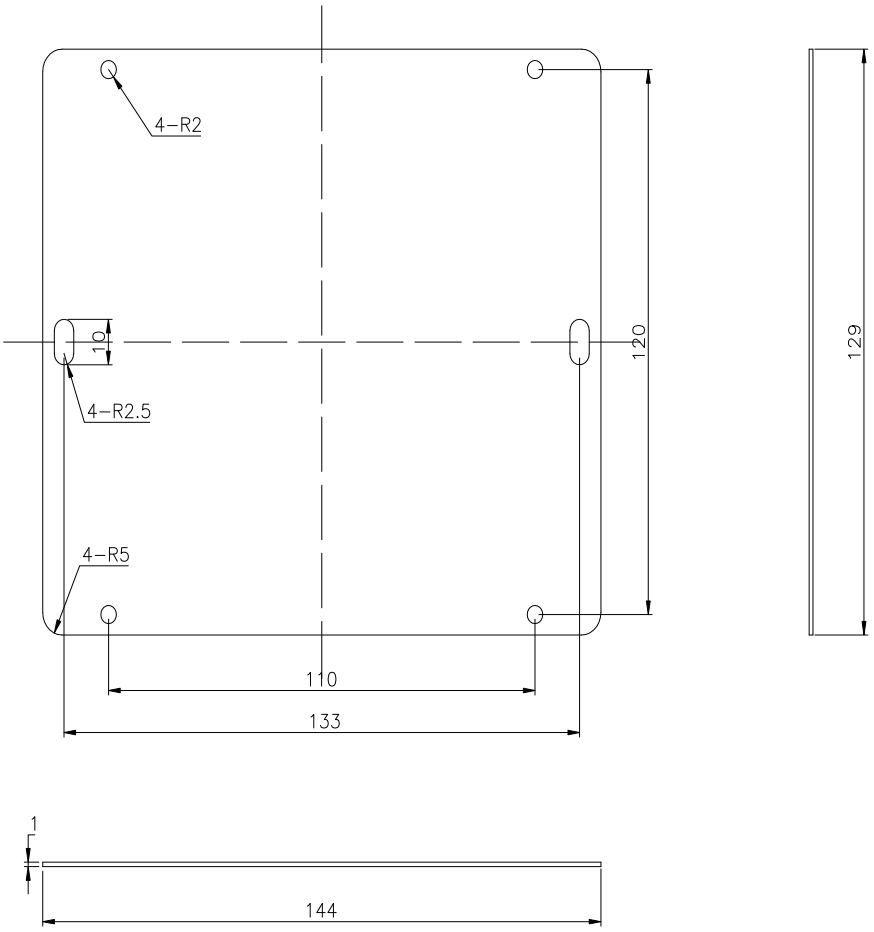


Figure 5.3 Installation dimensions of car roof control board base plate

5.1.2 Definitions of car roof control board SM.02/H-A(I) plug-ins and ports

Table 5.1 Definitions of car roof control board SM.02/H-A(I) input and output ports

Table 5.2: Specification of Connectors for Car Top Control Board SM.02/H-A(I)

Socket No.	Model	Socket No.	Model
JP1	CH3.96-4A	JP5	5.08-3P-V-green
JP2	IDC-14P	JP6	5.08-4P-V-green
JP3	5.08-5P-V-green	JP7	CH2510-10A
JP4	5.08-7P-V-green	JP8	5.08-2P-V-green

Table 5.3: Definition of Input / Output Port of Car Top Control Board SM.02/H

No.	Position	Definition	Remarks
JP1	JP1.1	24V red	
	JP1.2	GND yellow	
	JP1.3	CANH green	
	JP1.4	CANL blue	
JP2		Car roof connecting extension board	
JP3	JP3.1	Output JP3.2-JP3.3 common port	
	JP3.2	Output HY0, down arrival chime	
	JP3.3	Output HY1, up arrival chime	
	JP3.4	Output 0V	
	JP3.5	Output 24V	
JP4	JP4.1	Input JP4.2-JP4.3 common port	
	JP4.2	Input HX0, front door closed limit	N/C (default)
	JP4.3	Input HX1, front door opened limit	N/C (default)
	JP4.4	Output JP4.5-JP4.7 common port	
	JP4.5	Output HY2, forced front door closing output	
	JP4.6	Output HY3, front door closing signal output	
	JP4.7	Output HY4, front door opening signal output	
JP5	JP5.1	Input JP5.2-JP5.3common port ,0V	
	JP5.2	Input HX2, front door safety edge	N/C (default)
	JP5.3	Input HX3, front door beam screen	N/O (default)
JP6	JP6.1	Input JP6.2-JP6.4 common port, 0V	
	JP6.2	Input HX4, light load	N/O (default)
	JP6.3	Input HX5, full load	N/O (default)
	JP6.4	Input HX6, overload	N/O (default)
JP7	JP7.1	Parallel voice interface D0, LSB	
	JP7.2	Parallel voice interface D1	
	JP7.3	Parallel voice interface D2	
	JP7.4	Parallel voice interface D3	
	JP7.5	Parallel voice interface D4	
	JP7.6	Parallel voice interface D5	
	JP7.7	Parallel voice interface D6	
	JP7.8	Parallel voice interface D7, MSB	
	JP7.9	common port 0V	
	JP7.10	common port ＋24V	
JP8	JP8.1	JP8.2 common port	
	JP8.2	Output HY5, lighting fan relay	

No.	Position	Definition	Remarks
	JP8.3	Output HY6,Sound and light alarm output	
	JP8.4	Output JP8.3 common port	
	JP8.5	Output HY7, spare	
	JP8.6	Output JP8.5 common port	
DB1		Program burning port	
SW1	SW1.1	If collective plug-out is ON, then close CAN terminal resistance, if collective plug-out is OFF, then open terminal resistance.	
	SW1.2		
SW2	SW2.1	If collective plug-out is ON, then it is program buring state, if collective plug-out is OFF, then it is normal operation state.	
	SW2.2		

Note:

1. Output from parallel voice port

The JP 7 port of SM-02/H outputs eight-bit binary coding pulse signals, triggering voice landing forecast during deceleration of car for stop; pulse output duration is 1.0s. The eight-bit output is in the mode of transistors with open loop in the collector and shared anode at the output voltage of DC24V and current capacity of 50mA. The 8-bit binary coding provides as many as 255 output statuses in accordance with STEP WORD BANK for display; in other words, supposing t that the user set B1 for F1 display, the corresponding display code is 60. Therefore, JP7 output signal is to transform the decimal bit of 60 into binary bit before output. “B1 arrived” is to be broadcasted by decoding that binary signal. Currently, 0-247 are processed by the definition of the word bank for display (see STEP Word Bank for Display Codes in Section 6.5.10) whereas, output of codes from 248 to 255 are defined as follows:

(248) 11111000: When the elevator stops at the main landing, and tends to move upward, this signal is to be output after elevator door is closed;

(249) 11111001: This signal is to be output when the elevator is at fire alarm status;

(250) 11111010: Elevator door is opening; this signal is to be output when elevator door closing limit is switched over from disconnection to connection status;

(251) 11111011: Elevator door is closing; this signal is to be output when elevator door opening limit is switched over from disconnection to connection status;

(252) 11111100: Overload alarm;

(253) 11111101: Forecast the next moving direction as upward when the door is opened to position;

(254) 11111110: Forecast the next moving direction as downward when the door is opened to position;

(255) 11111111: To be defined.

2. Connection method

➢ **Car top controller and connection between power source and CAN Bus**

Power supply and CAN Bus of car top controller is led in from JP1. JP1.01 and JP1.02 are for TXV+ and TXV- respectively; JP1.02 and JP1.04 are for TXA+ and TXA-; TXV+ and TXV- serve as input power supply DV24V; TXA+ and TXA- are communication lines. All communication lines are to be in 4-core twisted pairs.

➢ **Connection of car top controller input signal**

Car top controller mainly aims to collect partial switching signals from car top and bottom, and

transmit such signal status to main controller via CAN Bus. Such switching signals include door opening/closing input, door opened/closed to position, safety edge, overload and full load.

- **Connection of car top controller output signal**

Car top controller aims to control output of relay according to signals transmitted by the main controller via CAN Bus; its relay is used to control arrival gong relay, lighting relay and so on so as to further control such functions as arrival forecast and energy-saving lighting.

5.2 Description of car roof expansion board SM.09IO/B

5.2.1 Outline drawing and installation dimensions of car roof expansion board SM.09IO/B

Figure 5.4 Outline drawing of car roof expansion board

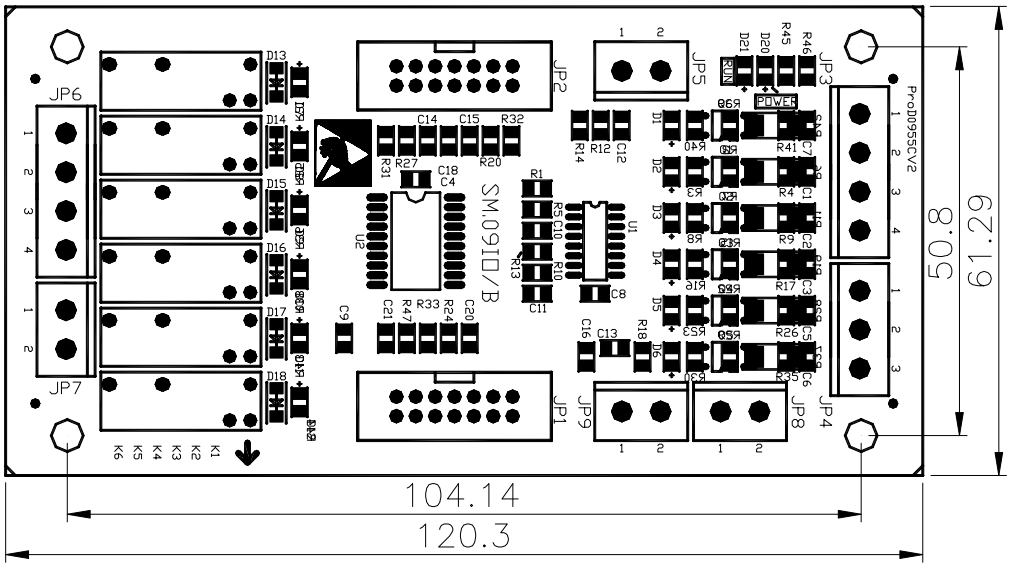


Figure 5.5 Installation dimensions of car roof expansion board

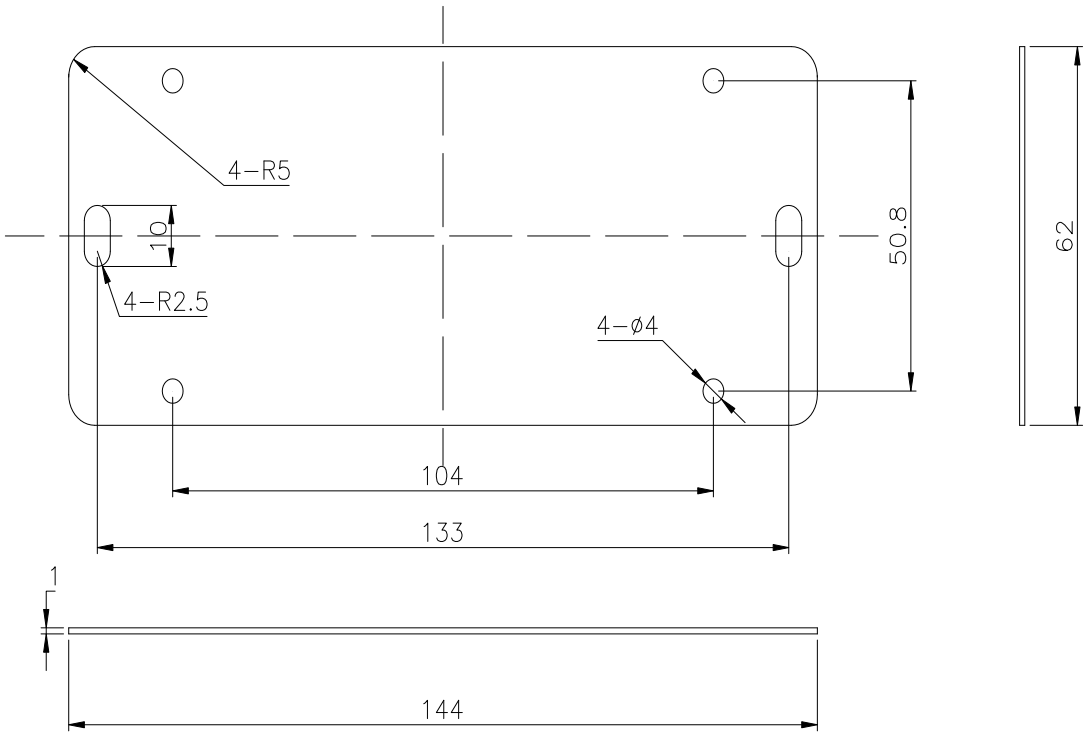


Figure 5.6 Installation dimensions of car roof expansion board base plate

5.2.2 Definitions of car roof expansion board SM.09IO/B plug-ins and ports

Table 5.2 Car roof expansion board SM.09IO/B plug-in specifications

Socket no.	Model	Socket no.	Model
JP1/JP2	IDC-14P	JP4	5.08-3P-V-Green
JP3/JP6	5.08-4P-V-Green	JP5/JP7/JP8/JP9	5.08-2P-V-Green

Table 5.3 Definitions of SM.09IO/B input and output ports when used for car roof expansion board

S.N.	Location	Definition	Remark
JP1	Connecting car roof board SM.02/H		
JP2	Connecting car roof expansion board		
JP3	JP3.1	Input HX7, rear door open in place	NC defaulted
	JP3.2	Input HX8, rear door close in place	NC defaulted
	JP3.3	Input HX9, rear door light curtain	NO defaulted
	JP3.4	Input power supply, need to connect switching power supply +24V	
JP4	JP4.1	Input HX10, rear door safety edge	NO defaulted
	JP4.2	Input HX11, backup	
	JP4.3	JP4.1-JP4.2 input common port, 0V	
JP5	JP5.1	Input HX12, backup	
	JP5.2	JP5.1 input common port, 0V	
JP6	JP6.1	Output HY6, rear door open signal output	
	JP6.2	Output HY7, rear door close signal output	
	JP6.3	Output HY8, rear door nudging output	
	JP6.4	Output JP6.1-JP6.3 common port	
JP7	JP7.1	Output HY6, front door open signal output	
	JP7.2	Output JP7.1 common port	
JP8	JP8.1	Output HY10, front door open signal output	
	JP8.2	Output JP8.1 common port	
JP9	JP9.1	Output HY11, front door nudging output	
	JP9.2	Output JP9.1 common port	

Note: Though JP7, JP8 and JP9 ports are defined as same as in SM.02/H car roof board, the relevant front door output ports (opt-coupler output) of SM.02/H are not relay output, it is possible to fail to drive the DC door machine; in this case, it is required to use the JP7, JP8 and JP9 outputs of car roof expansion board.

5.3 Description of car control board SM.02/G(I)

5.3.1 Outline drawing and installation dimensions of car control board SM.02/G(I)

Figure 5.7 Outline drawing of car control board

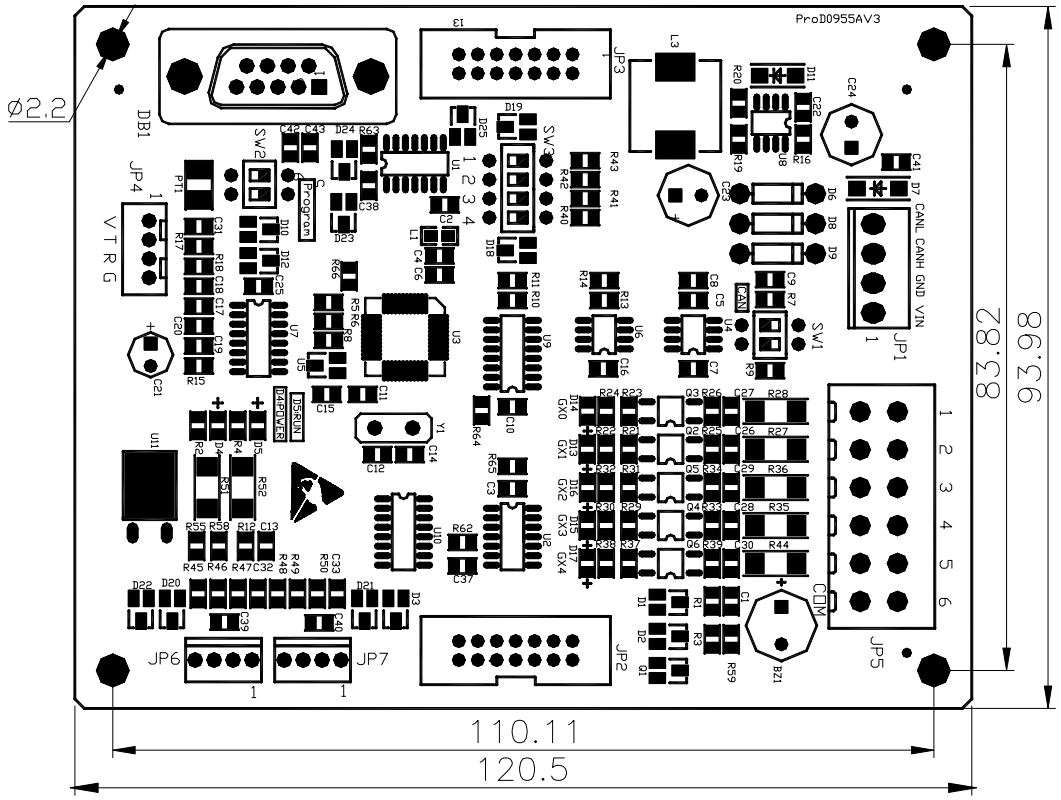


Figure 5.8 Dimensional drawing of car control board

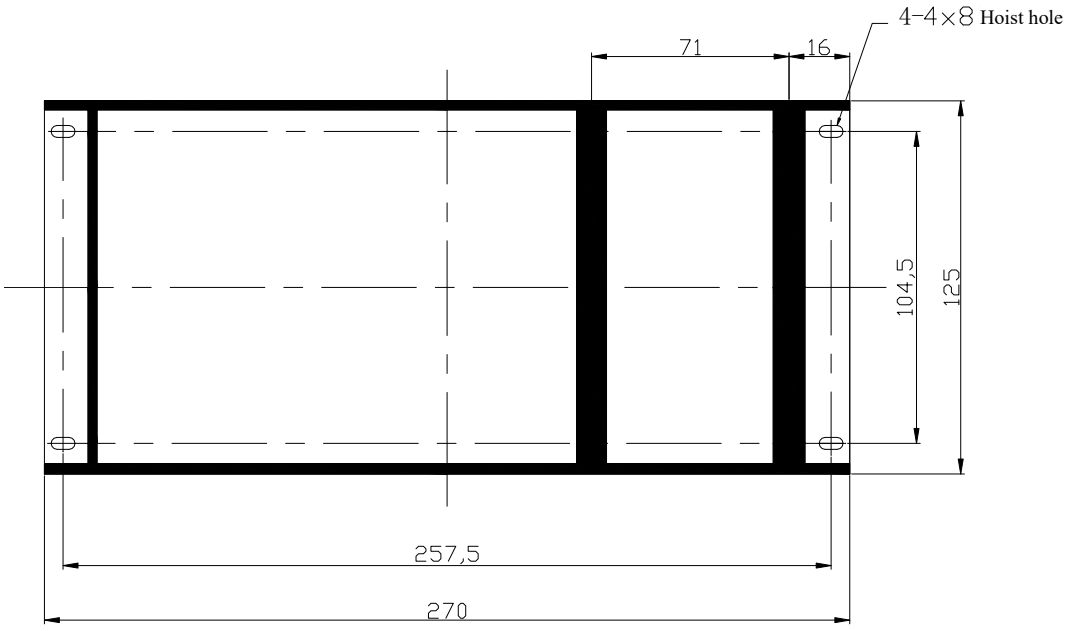


Figure 5.9 Dimensional drawing of standard combined mounting base plate of car control board (SM.03D command board may be installed side-by-side)

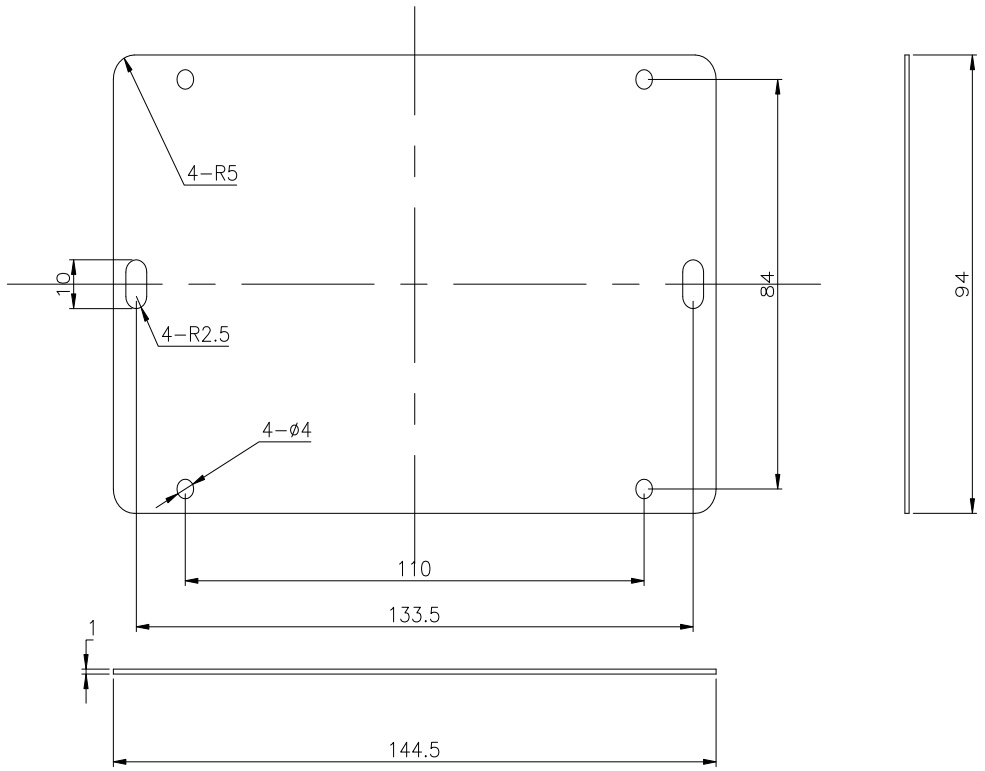


Figure 5.10 Dimensional drawing of galvanized mounting base plate of car control board

5.3.2 Introduction to definitions of car control board SM.02/G plug-ins and ports

Table 5.4 Definitions of car control bard SM.02/G ports

Table 6.6: Specification of Connectors for Car Top Control Board SM.02/G

Socket No.	Model	Socket No.	Model
JP1	CH3.96-4A	JP5	5.08-6P
JP2/JP3	IDC-14P	JP6/JP7	CH2510-4A
JP4	B4B-XH-A		

Table 5.5: Definition of Car Top Control Board SM.02/G Port

No.	Pos.	Definition	Remark
JP1	JP1.1	24V (red)	
	JP1.2	GND (yellow)	
	JP1.3	CANH (green)	
	JP1.4	CANL (blue)	
JP2	Connected to command board		
JP3	Connected to car extension board		
JP4	Car debugging port		
JP5	JP5.1	Input GX0, direction change by attendant	Default NO
	JP5.2	Input GX1, attendant	Default NO
	JP5.3	Input GX2, independent	Default NO

No.	Pos.	Definition				Remark
	JP5.4	Input GX3, attendant by-pass				Default NO
	JP5.5	Input GX4, firemen				Default NO
	JP5.6	Input JP5.1-JP5.5 signal common port				Default NO
JP6	JP6.1	Door opening indicator light power source－				
	JP6.2	开 Door opening indicator light power source＋				
	JP6.3	Door opening button (GX5)				
	JP6.4	Door opening button				
JP7	JP7.1	Door closing indicator light power source－				
	JP7.2	Door closing indicator light power source＋				
	3	Door closing button (GX6)				
	4	Door closing button				
DB 1	Programming port					
SW 1	SW1.1	When switched over to ON and OFF simultaneously, CAN terminal resistor is to be connected and disconnected respectively.				
	SW1.2					
SW 2	SW2.1	When switched over to ON and OFF simultaneously, it would refer to programming status and normal operation respectively.				
	SW2.2					
SW 3	SW3.1	SW3.2	SW3.3	SW3.4	Manipulation cabinet type	
	ON	OFF	OFF	OFF	Main manipulation cabinet	
	OFF	ON	OFF	OFF	Rear manipulation cabinet	
	OFF	OFF	ON	OFF	Disabled manipulation cabinet	
	OFF	OFF	OFF	ON	Auxiliary manipulation cabinet	

Table 5.6: Definition of SM.09IO/B I/O Port When Used for Car Top Extension Board

No.	Pos.	Definition	Remark
JP1	Connected to car board SM.02/G		
JP2	Connected to the second car extension board		
JP3	JP3.1	Input GX7, backup	
	JP3.2	Input GX8, backup	
	JP3.3	Input GX9, backup	
	JP3.4	Input power supply need to connect the power supply of switch +24V	
JP4	JP4.1	Input GX10, door opening holding button input	Default NO
	JP4.2	Input GX11, NS-SW	Default NO
	JP4.3	JP4.1-JP4.2common port, 0V	
JP5	JP5.1	Input GX12, backup	
	JP5.2	Input power supply need to connect the power supply of switch +24V	
JP6	JP6.1	Output GY0, door opening holding button output	
	JP6.2	Output GY1, backup	
	JP6.3	Output GY2, backup	
	JP6.4	Output JP6.1-JP6.3 common port	
JP7	JP7.1	Output GY3, backup	
	JP7.2	Output JP7.1 common port	
JP8	JP8.1	Output GY4, backup	
	JP8.2	Output JP8.1 common port	
JP9	JP9.1	Output GY5, backup	
	JP9.2	Output JP9.1 common port	

Note:

- **Car control board and connection between power supply and communication bus**

The power supply and communication of car control board is lined in with JP1, in which JP1.01 and JP1.02 are TXV+ and TXV-; JP1.03 and JP1.04 are TXA+ and TXA -; TXV+ and TXV- serve as input power supply DC24V; whereas TXA+ and TXA- are communication lines. All communication lines are to be in 4-core twisted pairs.

- **Connection of car top control board input signal**

Car control board mainly aims to collect car switching signals, and transmit these signal statuses to main controller through CAN bus. These switching data signals include door open/close input, attendant, by-pass, etc.

- **Car control board output signal connection**

Car control board control the transistor output through the signal transmitted from CAN bus. Output control by transistor includes output of door opening/closing button lamp and so on.

- **Connection between car control board and instruction controller**

As the connection line between instruction extension control board and car control board is preinstalled in the car, it is only needed to insert the pin into the JP2 groove.

- **Door opening/closing button and indicator light connection method**

Pin 1 and 2 are to be connected to "－" and "＋" terminals of power source; whereas pin 3 and 4 are to be connected to door opening/closing button terminal.

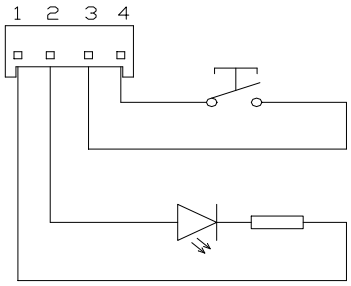


Figure 5.11 Wiring Diagram for Door Opening / Closing and Indicator Light

5.4 Instruction Control Board SM-03

5.4.1 Profile and Installation Dimension of Instruction Control Board SM.03

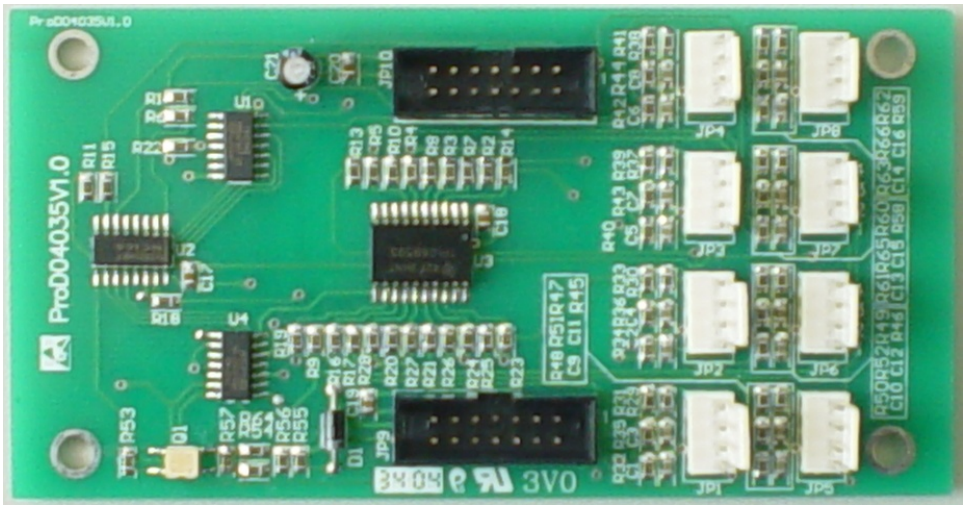


Figure 5.12 Profile of Instruction Control Board

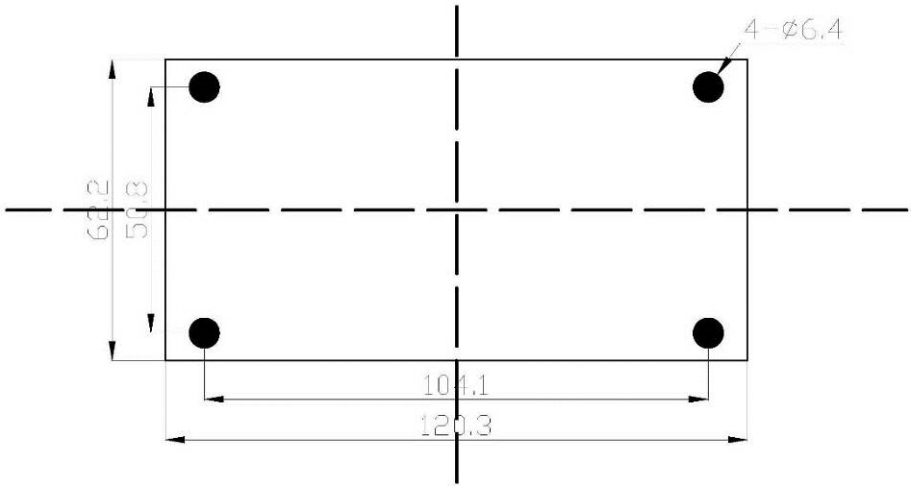


Figure 5.13 Installation Dimension of Instruction Control Board

5.4.2 Introduction to Connectors and Port of Instruction Control Board SM-03

Table 5.9: Specification of Instruction Control Board Specification

Socket No.	Model
JP1/JP2/JP3/JP4/JP5/JP6/JP7/JP8	CH2510-4
JP9/JP10	14-pin parallel dot-matrix socket

Table 5.10: Definition of Instruction Control Board Ports

No.	Definition of 1# Instruction Controller Pin	Definition of 2# Instruction Controller Pin	…	Definition of 8# Instruction Controller Pin
JP1	Connected to F1 command button	Connected to F9 command button	…	Connected to F57 command button

No.	Definition of 1# Instruction Controller Pin	Definition of 2# Instruction Controller Pin	…	Definition of 8# Instruction Controller Pin
JP2	Connected to F2 command button	Connected to F10 command button	…	Connected to F58 command button
JP3	Connected to F3 command button	Connected to F11 command button	…	Connected to F59 command button
JP4	Connected to F4 command button	Connected to F12 command button	…	Connected to F60 command button
JP5	Connected to F5 command button	Connected to F13 command button	…	Connected to F61 command button
JP6	Connected to F6 command button	Connected to F14 command button	…	Connected to F62 command button
JP7	Connected to F7 command button	Connected to F15 command button	…	Connected to F63 command button
JP8	Connected to F8 command button	Connected to F16 command button	…	Connected to F64 command button

Note:

- **Instruction button and indicator light connection method**

Pin 1 and 2 are to be connected to "—" and "+" power source terminal of indicator light; whereas pin 3 and 4 are to be connected to instruction button terminal.

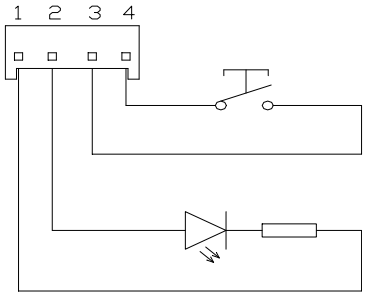


Figure 5.14 Wiring Diagram for Instruction Button and Indicator Light

Table 5.5 Definitions of SM.09IO/B input and output ports when used for car expansion board

5.4 Description of group control board (SM.GC/C)

5.4.1 Outline and installation dimensions of group control board

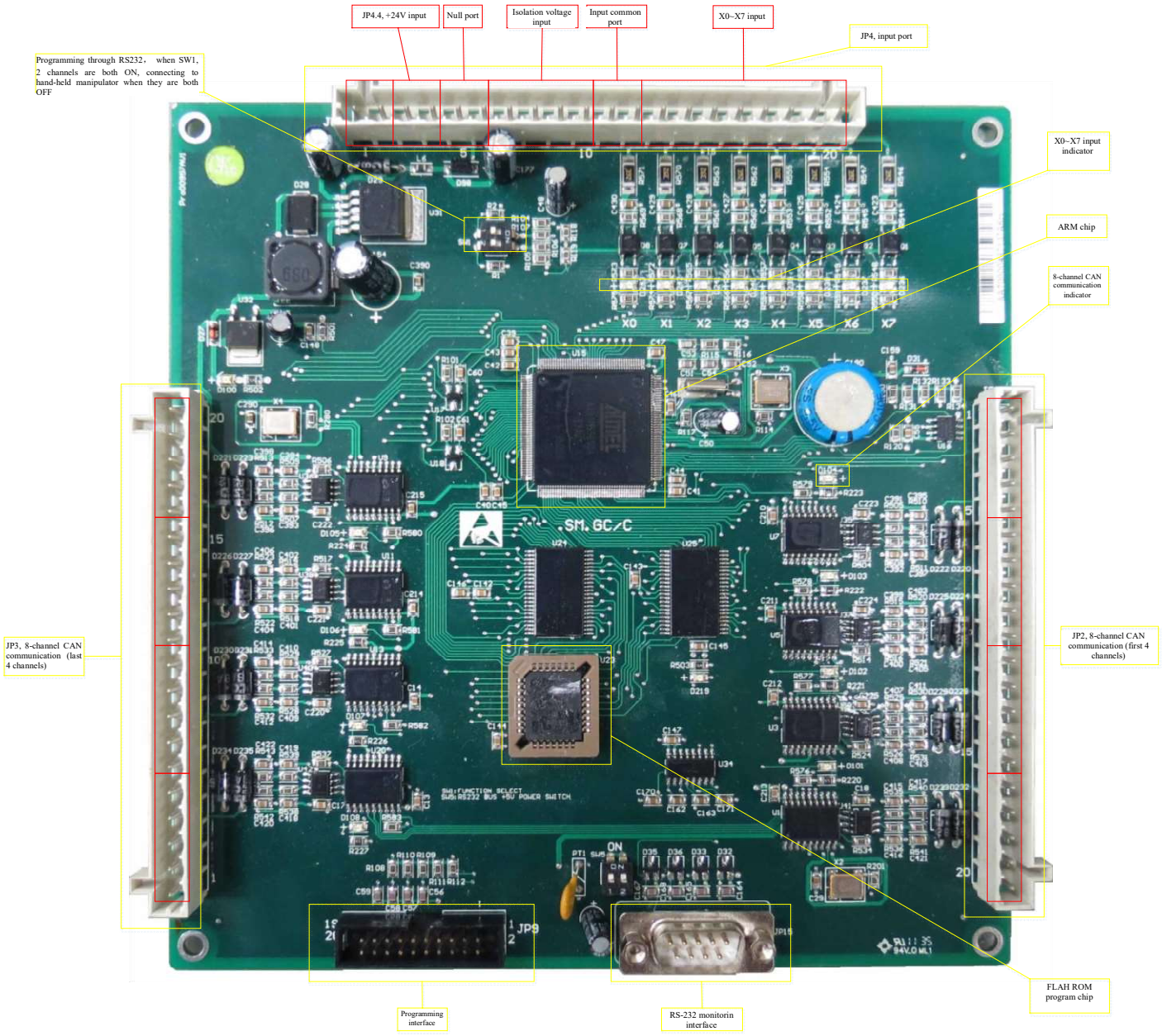


Figure 5.11 Outline of group control board

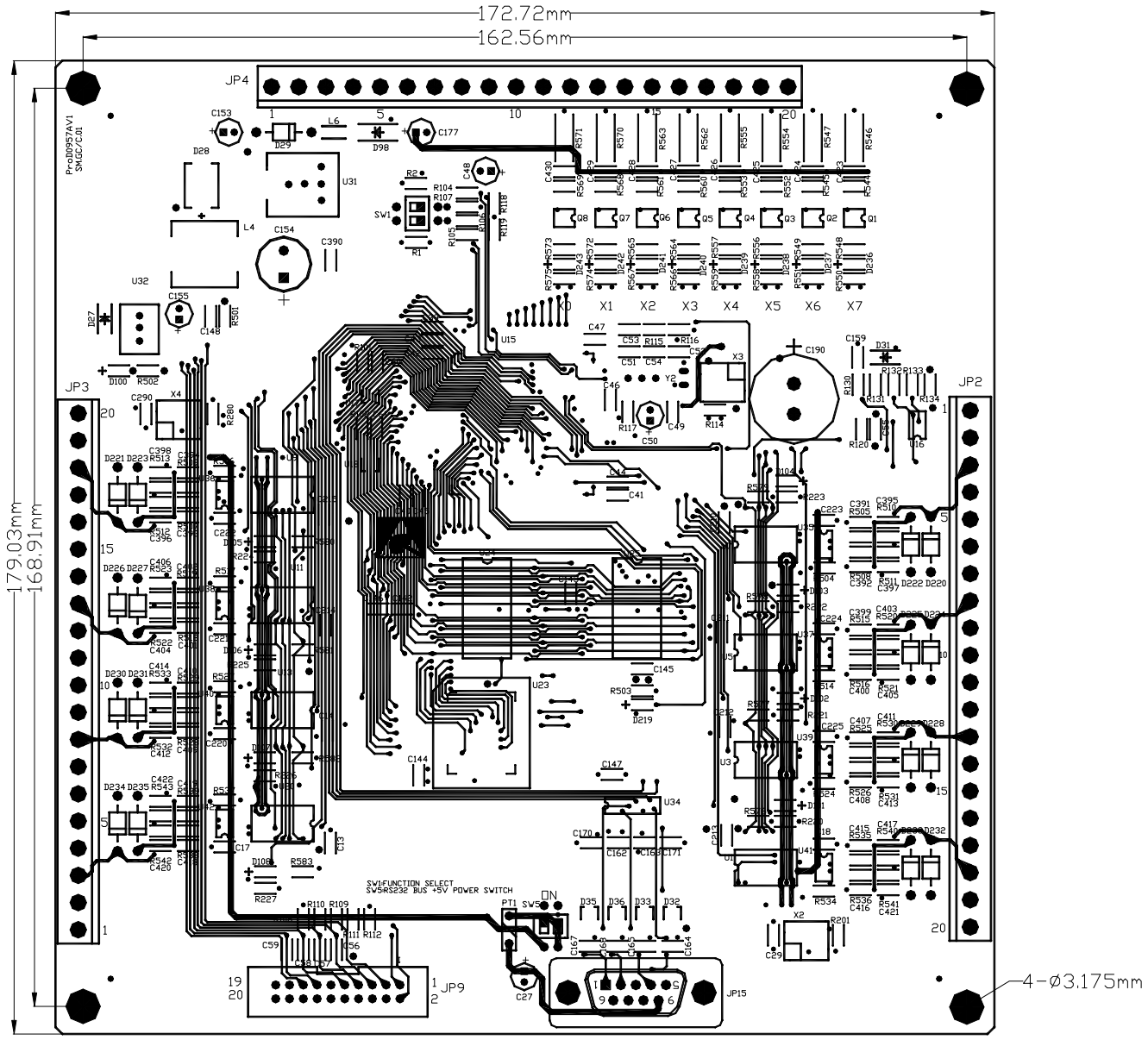


Figure 5.12 Installation dimensions of group control board

5.4.2 Definitions of group control board ports

Table 5.6 Definitions of JP2, JP3 ports

Note: Flashing of corresponding light emitting diode indicates good communication.

Table 5.7 Definitions of JP4 ports (digital input definitions JP4.7~JP4.20)

S.N.	Location	Code	Port definition	Corresponding light emitting diode
JP4	JP4.1			None

S.N.	Location	Code	Port definition	Corresponding light emitting diode
	JP4.2			
	JP4.3	0V	Negative terminal 0V for +24V power supply	D100
	JP4.4	+24V	+24V power supply input	
	JP4.5		Null terminal	None
	JP4.6		Null terminal	
	JP4.7	+24V	VISO+, isolated positive power supply input	
	JP4.8	+24V	VISO+, isolated positive power supply input	
	JP4.9	+24V	VISO+, isolated positive power supply input	
	JP4.10		VISO-, isolated negative power supply input	
	JP4.11	Common port	Input common port, internally connected to JP4.10	
	JP4.12	Common port	Input common port, internally connected to JP4.10	
	JP4.13	X7	Standby	D243
	JP4.14	X6	Standby	D242
	JP4.15	X5	Check-in peak hour service switch	D241
	JP4.16	X4	No. 2 switch of service floor switching scheme	D240
	JP4.17	X3	No. 1 switch of service floor switching scheme	D239
	JP4.18	X2	Check-off peak hour service switch	D238
	JP4.19	X1	Group partition switch	D237
	JP4.20	X0	Abnormal power supply detection	D236

Additional description of other interfaces of group control board. P1: RS232 monitoring interface, for connection to notebook PC.

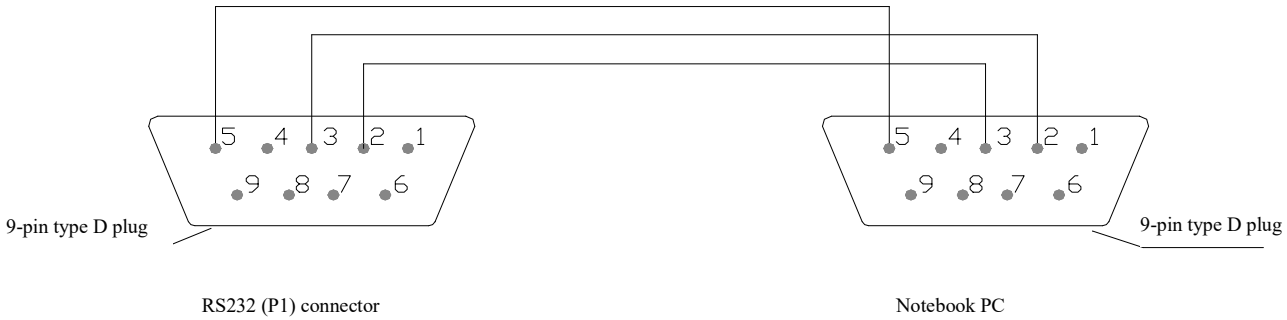


Figure 5.12 Schematics for connection of RS232 monitoring port to computer

Table 5.8 Definition of RS232 port

SM.GC/C (P1)	Computer (RS232)	Remark
2	3	RXD
3	2	TXD
5	5	SGND

VI. Parameter list of integrated drive controller

Table 6.1 Parameter list

No.	Name	Factory Setup	Scope	Unit	Remarks
F00	Accelerating slope	0.550	0.200～1.500	m/s^2	
F01	Decelerating slope	0.550	0.200～1.500	m/s^2	
F02	S curve T0 (initial S angle time T0)	1.300	0.300～3.000	s	
F03	S curve T1 (S angle T1 at end of acceleration)	1.100	0.300～3.000	s	
F04	S curve T2 (S angle time T2 at the beginning of deceleration)	1.100	0.300～3.000	s	
F05	S curve T3 (S angle time T3 at the end of deceleration)	1.300	0.300～3.000	s	
F06	Elevator rated speed	1.750	0.100～10.000	m/s	
F09	Locking elevator base floor	1	1～64	×	
F10	Offset floor number	0	0～64	×	
F11	Pre-set floor number	18	2～64	×	
F12	Maintenance speed	0.250	0～0.630	m/s	
F13	Return to leveling speed	0.060	0.010～0.150	m/s	
F14	Closing door delay 1 (repsonseing to hall call)	3.0	0～30.0	s	
F15	Closing delay 2 (repsonse to car call)	3.0	0～30.0	s	
F16	Openning brake delay	0.2	0～2.0	s	
F17	Operation signal release time when automatic	0.6	0.2～3.0	s	
F18	Firefighting base landing	1	1～64	×	
F19	Fire station 2	1	1～64		
F20	The delay time of returnning to base landing	0	0～65535	s	0 represents not open; other numbers represents open
F21	Leveling switch motion delay distance (full-speed)	6	0～40	mm	
F22	The base landing which the SIMPLEX and DUPLEX elevator return to	1	1～64	×	
F23	Group control mode	0	0～3	×	
F24	Drive mode	1	1～2		1. Analog operation;0 digital operation;2: with the amount of crawling simulation, generally can not be modified
F25	Input type 1 (NO/NC setup for X0～X15 input points)	819	0～65535	×	
F26	Input type 2 (NO/NC setup for X16～X25 input points)	2	0～65535	×	
F27	Elevator car board input type (NO/NC setup for GX0～GX15 input points)	0	0～65535	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F28	Car roof board input type (NO/NC setup for HX0～HX15 input points)	327	0～65535	×	
F29	Service floor 1 (Set up whether 1～16 floors can be docked)	65535	0～65535	×	
F30	Service floor 2 (Set up whether 17～32 floors can be docked)	65535	0～65535	×	
F31	Service floor 3 (Set up whether 33～48 floors can be docked)	65535	0～65535	×	
F190	Service floor 4 (Set up whether 49～64 floors can be docked)	65535	0～65535	×	
F33	Auomatic operation interval for test running	5	0～60	s	
F34	Automatic operation times for test running	0	0～65535		
F35	Firefighting switch input port definition and firefighting mode selection	0	0～65535	×	Bit0: 0: ordinary firefighting, 1: Schindler firefighting mode Bit1: reserved. Bit2: 0: standard firefighting indicatoir indication signal output; 1: Shandong firefighting indication signal output: 1) after the firefighting base landing door opening and arriving the position, the firefighting returning back state, output the firefighting indication signal; 2) When under the fireman state, firefighting indication signal output, or when the elevator is leaving the firefighting base landing, the firefighting indication signal will not output. Bit3: 0: Motherboard X15 input point is for firefighting return; 1: Motherboard X15 input point is for fireman switch.
F36	Brake switch detection mode	0	0～2	×	
F40	Weight data bias	48	0～100	%	
F41	Weighter self-study and parameter setup command	0	0/1/2/10/20/30/ 40/50/60	×	
F42	Input type 2 (normally open or normally closed Settings for X32~X47 input points)	1	0～65535	×	
F43	Buzzing/flashing function selection for attendant status call	3	0～65535	×	.
F44	Serial communication local address (255 for non-monitor)	255	0～255	×	
F49	Emergency leveling orientation mode	0	0～2		
F50	Front door opening permission 1 (opening setup value for floor 1～16)	65535	0～65535	×	
F51	Front door opening permission 2 (opening setup value for floor 17～32)	65535	0～65535	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F52	Front door opening permission 3 (opening setup value for floor 33～48)	65535	0～65535	×	
F191	Front door opening permission 4 (opening setup value for floor 49～64)	65535	0～65535	×	
F53	Rear door opening permission 1 (opening setup value for floor 1～16)	0	0～65535	×	
F54	Rear door opening permission 2 (opening setup value for floor 17～32)	0	0～65535	×	
F55	Rear door opening permission 3 (opening setup value for floor 33～48)	0	0～65535	×	
F192	Rear door opening permission 4 (opening setup value for floor 49～64)	0	0～65535	×	
F56	Up leveling adjustment (50 to fiducial value)	50	0～240	mm	
F57	Down leveling adjustment (50 to fiducial value)	50	0～240	mm	
F59	Zero speed braking delay	0	0～10.00	0.01s	
F61	Arriving distance for arrival gong	1200	0～4000	mm	
F62	Anti-slipping limit time	32	0～65535	s	
F64	Floor correction	0	0～65535		
F65	Base electrode lock mode	0	0～1	×	0: No base electrode lock, 1: once output contactor off, immediate lock
F66	With or whithout up and down limt	0	0-1	×	0:no 1:yes
F67	With or whithout entension board	0	0-1	×	0:no 1:yes
F68	Input point self-learning	0	0～65535		
F69	Test run mode	0	0～65535		
F70	Light load uplink gain	100	0-300	%	
F71	Light load lowlink gain	100	0-300	%	
F72	Heavy load uplink gain	100	0-300	%	
F73	Heavy load lowlink gain	100	0-300	%	
F74	Light load height gain	512	0-1024		
F75	Heavy load height gain	512	0-1024		
F76	Inspection filter	0	0-100	ms	
F77	Remote intelligent diagnostics enables CAN2 active transmission	0	0-1	×	
F80	Door lock short delay test	0	0~300	×	
F113	The main dock layer	0	0～64	×	
F115	Limit time for opening door overtime	15	3～30	s	
F116	Limit time for closing door overtime	15	3～30	s	
F117	Keeping opening time for forced closing door	60	0～1300	s	
F118	Keeping opening time for the disabled	10	0～1300	s	

No.	Name	Factory Setup	Scope	Unit	Remarks
F120	Car call number when anti-nuisance function activates.	0	0～30	×	
F121	Activate forced closing function (0 represents not activate)	0	0～1	×	
F122	Operation signal delay release time during inspection	0.3	0～10.0	s	
F123	Call classification	0	0～3	x	
F124	Define the function of X16 input point of the mainboard	0	0～2	S	
F127	Top level no load compensation	100	0~200	%	
F128	Control mode of front and rear doors	0	0~65535	×	0: separate control of front and rear doors; 1: joint control of front and back doors
F129	Activate the functions of re-leveling after opening door and/or pre-opening	0	0～3	×	
F130	Maintain the opening/closing torque	0	0～15	×	Bit0: 1: maintaining for door opening Bit1: 1: maintaining for door closed Bit2: 1: maintaining for door closed during operation
F134	External call IC card floor 1 (Floor 1~ 16)	0	0-65535		
F135	External call IC card floor 2 (Floor 17~ 32)	0	0-65535		
F136	External call IC card floor 3 (Floor 33~ 48)	0	0-65535		
F137	Service floor 1 (Floor 1~ 16) when NS-SW function is set.	65535	0～65535	×	
F138	Service floor 2 (Floor 17~ 32) when NS-SW function is set	65535	0～65535	×	
F139	Service floor 3 (Floor 33~ 48) when NS-SW function is set	65535	0～65535	×	
F199	Service floor 4 (Floor 49~ 64) when NS-SW function is set	65535	0～65535	×	
F140	This floor enabled by the arrival clock	0	0~1	×	
F141	Time of delay release of the main contactor (after enabled)	0.50	0.50～6.0	s	Synchronize with F228. If F228<0.5S, F141=0.5S; otherwise F141=F228
F142	Delay sealing star	2.00	0.5~6.00	s	
F143	Iot voice soothing play time	0	0~65525	s	
F145	Bus voltage gain	100	80～120	%	
F146	Position error distance	180	180～1000	mm	

No.	Name	Factory Setup	Scope	Unit	Remarks
F147	Protection mode of contact point detection	0	0～1		
F149	Open the door and wait for the light	0	0～65535	S	
F152	Lighting delay (fans turned off automatically, delay lighting)	180	0～65535	S	0: do not turn off the lights
F153	Detection whether with or without hall door lock high-voltage input point	1	0/1	×	0: No 1: Yes
F154	Analog weighing input minimum voltage	0	0~1000	V	
F155	Analog weighing input maximum voltage	1000	0~1000	V	
F156	Detection whether with or without door lock relay contact point	1	0/1	×	0: No 1: Yes
F160	Whether activate the function of manual removal off error instruction	1	0/1	×	0: No 1: Yes
F161	The function to set the time section floor blockade mode	0	0～65535	×	Bit0: 1: block instruction Bit1: 1: block upward call Bit2: 1: block downward call
F163	Choose whether the back-up power continues running after returning to the base for single elevator or parallel connection	0	0/1	×	0: stop running 1: may continue running
F164	Type of weighing device	99	0～99	×	See the manual for more detailed explanation
F165	Special control of door operation	0	0～65535	×	Bit0: 1: door closed during inspection Bit1: 1: door closed during debug running Bit2: 1: door opened at the base station Bit3: 1: whether open the door by LED operator
F166	New coed function selection	1	0~65535	×	Bit0:1: check whether the door lock is short Bit1:1: check the closing limit Bit2:1: shield back door detection
F167	End delay of emergency flat layer	30	10~300	s	
F168	Elevator No. with IC card service	0	0～65535	×	
F169	Selection of upward and downward calls by IC card	0	0～65535	×	
F170	When IC card function in the car, the option whether need to swiping IC card corresponding to floor 1～16	0	0～65535	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F171	When IC card function in the car, the option whether need to swiping IC card corresponding to floor 17～32	0	0～65535	×	
F172	When IC card function in the car, the option whether need to swiping IC card corresponding to floor 33～48	0	0～65535	×	
F175	Creeping speed at startup	0.006	0～0.100	m/s	
F180	Speed gain	100.0	0～110.0	%	
F181	Elevator No. at mutual parallel connection mode	0	0～1	×	
F182	Slow down switch series	0	0～10	×	0: determine automatically by speed
F183	Hoistway self-learn speed	0.800	0～1.000	m/s	
F184	Emergency flat velocity	0.1	0.010~0.2500	m/s	
F186	Creeping time at startup	0.50	0～10.00	s	
F187	Monitor items	0	0～255	×	
F193	Reserved				
F194	Reserved				
F195	Reserved				
F196	Second base station of the paralleleelevator	0	0～64	×	
F200	Inverter software version	Factory setup		×	Read-only
F201	Inverter drive mode	3	3	×	3:Vector control with speed sensor
F202	Motor type	0	0/1	×	0: Asynchronous 1: Synchronous
F203	Motor rated power	By Inverter parameter	0.40～160.00	KW	
F204	Motor rated current	By Inverter parameter	0.0～300.0	A	
F205	Motor rated frequency	50.00	0.00～120.00	Hz	
F206	Motor rated rotation speed	1460	0～3000	rpm	
F207	Motor rated voltage	By Inverter parameter	0～460	V	
F208	Number of poles of motor	4	2～128	×	
F209	Motor rated slip frequency	1.40	0～10.00	Hz	
F210	Encoder type	0	0/1/2	×	0: incremental encoder 1: SIN/COS encoder 2: ENDAT encoder
F211	Encoder pulse number	1024	500～16000	PPr	
F212	Zero speed PID adjustor gain P0	100.00	0.00～655.35	×	
F213	Zero speed PID adjustor integral I0	120.00	0.00～655.35	×	
F214	Zero speed PID adjustor differential D0	0.50	0.00～655.35	×	
F215	Low speed PID adjustor gain P1	70.00	0.00～655.35	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F216	Low speed PID adjustor integral I1	30.00	0.00～655.35	×	
F217	Low speed PID adjustor differential D1	0.50	0.00～655.35	×	
F218	Medium speed PID adjustor gain P2	120.00	0.00～655.35	×	
F219	Medium speed PID adjustor integral I2	25.00	0.00～655.35	×	
F220	Medium speed PID adjustor differential D2	0.20	0.00～655.35	×	
F221	High speed PID adjustor incremental P3	140.00	0.00～655.35	×	
F222	High speed PID adjustor integral I3	5.00	0.00～655.35	×	
F223	High speed PID adjustor differential D3	0.10	0.00～655.35	×	
F224	Low speed point switch frequency F0	1.0	0.0～100.0	%	
F225	High speed point switch frequency F0	50.0	0.0～100.0	%	
F226	Zero servo time	0.8	0.0～30.0	s	
F227	Brake release time	0.25	0.00～30.00	s	
F228	Current slow descent time	0.00	0.00～10.00	s	
F229	Torque compensation direction	0	0/1	×	0: positive direction 1: negative direction
F230	Torque compensation gain	100.0	0.0～200.0	%	
F231	Torque compensation bias	0.0	0.0～100.0	%	
F232	Filtering time for feedback signal of encoder	0	1～30	ms	
F233	Feedback direction of encoder	1	0/1	×	1:positive sequence 0:negative sequence
F234	Motor phase sequence	1	0/1	×	1: positive direction 0: negative direction
F235	Motor no-load current coefficient	32.00	0.00～60.00	%	Unnecessary to set up nomally
F236	PWM carrier frequency	6.000	1.100～11.000	kHz	Do not adjust this parameter under normal circumstances
F237	PWM carrier width	0	0.000～1.000	kHz	Do not adjust this parameter under normal circumstances
F238	Regulator mode	1	0/1/2/3	×	Do not adjust this parameter under normal circumstances
F239	Output torque limit	175	0～200	%	Do not adjust this parameter under normal circumstances
F240	Input voltage of inverter	380	0～460	V	
F241	Rated power of inverter			KW	This is a read-only query data
F242	Phase angle of encoder	0.0	0.0～360.0	Degree	
F243	Zero position correction of encoder	0	0/2	×	Set 2 to rectify zero point
F244	Spare				
F245	Selection of F246~F255 parameter function	0	0～65535	×	Modify this parameter, then F246～F255 will have different meanings
When F245=0, F246~F255 have the following meanings					
F246	Overheating protection time for radiator	50	000～65535	0.01s	Default protect after more than 0.5 second from radiator overheating

No.	Name	Factory Setup	Scope	Unit	Remarks
F247	Overspeed protection coefficient	12000	0～65535	0.01%	The default overspeed protection threshold is 120%
F248	Overspeed protection time	100	0～65535	0.01s	Default protect after more than 1 second of the speed surpassing F247 value.
F249	Confirmation times for inputting open phase	60	0～65535	Time	Default protect after more than 60 times of inputting open phase in a instant moment
F250	Confirmation times for short circuit of braking resistor	10	0～65535	Time	Default protect after more than 10 times of short circuited of the brake resistor
F251	Confirmation times for SinCos Encoder disconnection	2	0～65535	Time	Default protection in case of SinCos Encoder disconnection confirmed for more than twice
F252	Confirmation time for outputting open phase	2000	0～65535	0.001s	Default protect after more than 2 seconds from output open phase
F253	Confirmation of voltage for charging relay failure	65	0～65535	Volt	Protection after the three-phase in-operation input voltage reduces to 65/1.414=46V, fault 144 reported, the charging relay may be damaged or the grid voltage suddenly desend
F254	Confirmation threshold of Encoder phase CD failure	300	0～65535		No 28 failure reported in case that the D-value of the absolute position and computing position of encoder exceed the setting value
F255	Protection threshold of ABZ encoder disconnection	20	0～100		Protection if the synchronous motor speed feedback deviation surpass this value
When F245=1, F246~F255 have the following meanings					
F246	Protection times of IGBT	2	0~65535	Times	Times of instantaneous over current of IGBT
F247	Protection option of I^2t	0	0/1		0: I^2t protective 1: cancel I^2t protection
F248	Standby				Inner parameter, do not modify
F249	Standby				Inner parameter, do not modify
F250	Standby				Inner parameter, do not modify
F251	Standby				Inner parameter, do not modify
F252	Standby				Inner parameter, do not modify
F253	Standby				Inner parameter, do not modify
F254	Standby				Inner parameter, do not modify
F255	Standby				Inner parameter, do not modify
When F245=2, F246~F255 have the following meanings					
F246	Standby				Inner test parameter, do not modify

No.	Name	Factory Setup	Scope	Unit	Remarks
F247	PWM modulation mode	2	0～2	×	0: 5 segment mode; 1: 7 segment mode; 2: < 40% rpm, 7 segment mode; > 40%, 5 segment mode. At low speed, the intergrated controler has too much interference toward outside. For example, when CAN has a poor communication signal, the change to 0 (5 segment mode) will have significant effect, and it will reduce the emitted heat from the inverter, but may cause too much noise from inverter at low speed
F248	Standby				Internal test parameter, do not modify
F249	Standby				Internal test parameter, do not modify
F250	Three-phase current balance coefficient			×	Read-only, it will automatically change after doing calibration of three-phase current balance coefficient will. If synchronous motor may trigger the self-learning command of the asynchronous motor to pickup output contactor, and carry out the calibration of the three-phase current balance coefficient. Such function will reduce the motor vibration and improve comfort.
F251	Standby				
F252	Positive/negtive rotation enabled	0	0~60000	0.1s	0:allow Positive/negtive rotation 1:only allow positive rotation, and forbid the negtive rotation
F253	Position/negtive rotation dead-time	20	0~200	%	The zero-speed keeping time of positive/negative rotation shifting
F254	Accelerating overcurrent threshold of inverter	180	0～200	%	Inverter stop accelerating and maintain the current speed if overcurrent occur during the acceleration course. Continue to accelerate once the current descend
F255	Decelerating overvoltage threshold of inverter	750	0～800	V	Inverter stop decelerating and maintain the current speed if bus voltage is more than this set value during the deceleration course. Continue to decelerate once the voltage descend
When F245=3, F246~F255 have the following meanings					
F246	Current loop P	140	35～280	0.01	Current loop Kp (no need to modify)
F247	Current loop I	100	25～200	0.01	Current loop Ki(no need to modify)

No.	Name	Factory Setup	Scope	Unit	Remarks
F248	Current loop D	0	0～200	0.01	Current loop Kd(no need to modify)
F249	Standby				Inner parameter, do not modify
F250	Standby				Inner parameter, do not modify
F251	Standby				Inner parameter, do not modify
F252	Standby				Inner parameter, do not modify
F253	Standby				Inner parameter, do not modify
F254	Torque direction	0	0/1		0:positive 1:negtive
F255	Spare				Inner parameter, do not modify
When F245=4, F246~F255 have the following meanings					
F246	Software version			×	Read-only
F247	ID No.: 0			×	Read-only
F248	ID No.: 1			×	Read-only
F249	ID No.: 2			×	Read-only
F250	ID No.: 3			×	Read-only
F251	ID No.: 4			×	Read-only
F252	ID No.: 5			×	Read-only
F253	Inverter rated current			0.1A	Read-only
F254	Rated current of inverter current sensor			A	Read-only
F255	Motor power coefficient	200	50~400	%	Set the max power output of the motor, generally do not need to change
When F245=5, F246~F255 have the following meanings					
F246	Stator resistor			0.001 ohm	Stator resistor of asynchronous motor
F247	Rotor resistor			0.001 ohm	Rotor resistor of asynchronous motor
F248	Stator inductance			0.0001H	Stator inductance of asynchronous motor
F249	Rotor inductance			0.0001H	Rotor inductance of asynchronous motor
F250	Mutual inductor			0.0001H	Mutual inductance of asynchronous motor
F251	Motor low-speed overcurrent threshold	1500	0～65535	0.1%	Motor stop and motor low-speed overcurrent fault reported in case that when the motor speed is lower than 20% of rated speed, the current value is greater than F251 and its time duration is longer than F252
F252	Low-speed overcurrent time	600	0～65535	0.1s	Duration time of motor low-speed overcurrent
F253	Motor high-speed overcurrent threshold	1200	0～65535	0.1%	Motor stop and motor high-speed overcurrent fault reported in case that when the motor speed is higher than 80% of rated speed, the current value is greater than F253 and its time duration is longer than F254
F254	High-speed overcurrent time	3000	0～65535	0.1s	Time of duration of motor high-speed overcurrent

No.	Name	Factory Setup	Scope	Unit	Remarks
F255	Frequency dividing coefficient of encoder (PG card required)	0	0～7		0: (no frequency dividing), 1: (2 frequency dividing), 2: (4 frequency dividing), 3: (8 frequency dividing), 4: (16 frequency dividing), 5 (32 frequency dividing), 6: (64 frequency dividing), 7: (128 frequency dividing) Note: (PG card required)
When F245=6, F246~F255 have the following meanings					
F246	Whether synchronous motor do the angle self-study or not after power on?	1	0/1		Choose whether synchronous motor conduct angle self-study or not after power on . 0: no study, 1: study.
F247	Current gain when self-study	150	0～400	%	Current gain when synchronous motor conduct angle self-study
F248	Command option	2	0/1/2		Running command option
F249	Zero servo process current loop gain	100	48~65535	%	Zero servo process current loop gain
F250	Standby				
F251	Standby				
F252	Anti-slipping parameter	6616	0~65535		6616: activate anti-slipping function
F253	Standby				
F254	Standby				
F255	Standby				
When F245=7/8/9, F246~F255 are all standby					

VII. Fault analysis

7.1 Control system faults

Table 7.1 Control system fault codes

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
02	Door lock disengagement in operation (emergency stop)	01	During operation with safety loop but without door lock high voltage point	
		02	During operation with safety loop but without door lock low voltage point	
03	Elevator overtravels when going upwards	01	In automatic operation, the up and low limit switches are acting at the same time and the elevator is not at the highest landing	
		02	In upward operation, the elevator crosses the top levelling	
		03	When the elevator goes down without maintenance, it rushes through the ground floor	
04	Elevator overtravels when going downwards	01	In automatic operation, the up and low limit switches are acting at the same time and the elevator is not at the lowest landing	
		02	In downward operation, the elevator crosses the bottom levelling	
05	Door lock will not open	01	Door fails to open in position after the door-open signal outputs for consecutive 15 seconds, and occured for 3 times	After record the landing, front door or rear door for 3 times, it will report the fault 05
06	Door lock will not close	01	The signal output of the front door opening is not in place for 15 seconds in a row. If the station is changed, the door will be opened for 3 floors. If the station cannot be changed, the front door will be opened for 8 times	Record that the landing, front door or rear door will not close for 3 times
		02	Open the front door in place, and close the door in place not action, front door lock detection X22, more than 1.5S	
		03	The signal output of the back door opening is not in place for 15 seconds continuously. If the station is changed, the door will be open for 3 floors. If the station cannot be	
		04	Open the back door in place, and close the door in place not action, the back door X31 through detection, more than 1.5S	
07	Floor correction communication failure	01	After the parameter is turned on and the floor data is corrected, there is no communication between the floor and the elevator after running for 1.6s. After parking, there is no communication record between the floor and the magnetic bean input expansion board 2.4s	
08	CAN communication failure	01	The communication disconnected with lift car board SM-02 for consecutive 4 seconds	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
10	Malposition of up deceleration switch 1	03	Check during operation: the sigle level up deceleration switch action position is 100mm lower than the sigle level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the sigle level up deceleration switch action position is 150mm higher than the sigle level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the sigle level up deceleration switch have acted and present position is 100mm lower than the sigle level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the sigle level up deceleration switch have not acted and present position is 150mm higher than the sigle level up deceleration switch position from hoistway self-learning result.	
		07	In automatic operation, the up and low deceleration switches are acting at the same time and the elevator is not at the highest landing	
		08	The elevator is at the highest landing, but the up deceleration 1 have not acted.	
11	Malposition of down deceleration switch 1	03	Check during operation: the sigle level down deceleration switch action position is 100mm higher than the sigle level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the sigle level down deceleration switch action position is 150mm lower than the sigle level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the sigle level down deceleration switch have acted and present position is 100mm higher than the sigle level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the sigle level down deceleration switch have not acted and present position is 150mm lower than the sigle level down deceleration switch position from hoistway self-learning result.	
		07	In automatic operation, the up and low deceleration switches are acting at the same time and the elevator is not at the lowest landing	
		08	The elevator is at the lowest landing, but the down deceleration 1 have not acted.	
12	Malposition of up deceleration switch 2	03	Check during operation: the double level up deceleration switch action position is 150mm lower than the double level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the double level up deceleration switch action position is 250mm higher than the double level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the double level double deceleration switch have acted and present position is 150mm lower than the double level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the double level double deceleration switch have not acted and present position is 200mm higher than the double level up deceleration switch position from hoistway self-learning result.	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
13	Malposition of down deceleration switch 2	01	When the deceleration switch above the level-2 deceleration switch ACTS, the level-2 deceleration switch is not learned	
		02	S= the position of the next floor - the bottom floor - of the action point of the level 3 lower deceleration switch When the deceleration switch series is greater than level 2, the operating position of the deceleration switch at level 2 is lower than 3/5 of S Otherwise, the action position of level 2 lower deceleration switch is lower than the minimum deceleration distance	
		03	Check during operation: the double level down deceleration switch action position is 150mm higher than the double level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the double level down deceleration switch action position is 250mm lower than the double level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the double level down deceleration switch have acted and present position is 150mm higher than the double level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the double level down deceleration switch have not acted and present position is 200mm lower than the double level down deceleration switch position from hoistway self-learning result.	
14	Malposition of up deceleration switch 3	01	When the deceleration switch above the deceleration switch at level 3 ACTS, the deceleration switch at level 3 is not learned	
		02	S= the position of the upper floor of the action point of the deceleration switch at the bottom level -4 When the deceleration switch series is greater than level 3, the operating position of the deceleration switch on level 3 is higher than 3/5 of S Otherwise, the action position of level 3 lower deceleration switch is higher than the shortest deceleration distance	
		03	Check during operation: the treble level up deceleration switch action position is 250mm lower than the treble level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the treble level up deceleration switch action position is 300mm higher than the treble level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the treble level treble deceleration switch have acted and present position is 250mm lower than the treble level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the treble level double deceleration switch have not acted and present position is 300mm higher than the treble level up deceleration switch position from hoistway self-learning result.	
15	Malposition of down deceleration switch 3	01	When the deceleration switch above the 3-level deceleration switch ACTS, the 3-level deceleration switch is not learned	
		02	S= the position of the next floor - the bottom floor - of the action point of the step 4 deceleration switch When the deceleration switch series is greater than level 3, the operating position of the deceleration switch at level 3	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
			is lower than 3/5 of S Otherwise, the action position of level 3 lower deceleration switch is lower than the minimum deceleration distance	
		03	Check during operation: the treble level down deceleration switch action position is 250mm higher than the treble level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the treble level down deceleration switch action position is 300mm lower than the treble level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the treble level down deceleration switch have acted and present position is 250mm higher than the treble level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the treble level down deceleration switch have not acted and present position is 300mm lower than the treble level down deceleration switch position from hoistway self-learning result.	
16	Malposition of up deceleration switch 4	01	When the deceleration switch above the deceleration switch at level 4 is in action, the deceleration switch at level 4 is not learned	
		02	The action position of level 4 lower deceleration switch is higher than the shortest deceleration distance	
		03	Check during operation: the 4 level up deceleration switch action position is 250mm lower than the 4 level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the 4 level up deceleration switch action position is 300mm higher than the 4 level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the 4 level treble deceleration switch have acted and present position is 300mm lower than the 4 level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the 4 level double deceleration switch have not acted and present position is 300mm higher than the 4 level up deceleration switch position from hoistway self-learning result.	
17	Malposition of down deceleration switch 4	01	When the deceleration switch above the deceleration switch at level 4 moves, the deceleration switch at level 4 is not learned	
		02	The action position of level 4 lower deceleration switch is lower than the minimum deceleration distance	
		03	Check during operation: the 4 level down deceleration switch have acted and present position is 150mm higher than the 4 level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the 4 level down deceleration switch have acted and present position is 250mm lower than the 4 level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the 4 level down deceleration switch have acted and present position is 300mm higher than the 4 level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the 4 level down deceleration	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
			switch have not acted and present position is 300mm lower than the treble level down deceleration switch position from hoistway self-learning result.	
19	Door open/close position limit failure	01	At automatic mode, and when elevator stoped, door open limit switch and door close limit switch are in action at the same time for more than 1.5s	
		02	When the elevator stops, the door opening limit switch and the door closing limit switch at the same time work overtime for 1.5s	
20	Slip protection failure	01	In operation(except for during inspection), the leveling switch is not in action for over the time set in F62 (anti-slip time)	
		02	There are 3 kinds of speeds for operation at slow speed: the inspection speed V1 set by parameters, the calculated speed V2 from leveling spile length and leveling switch length, the calculated speed V3 from the max floor distance and anti-slip time. When ALP re-leveling, protect as the value that the max floor distance divide the minimum value of V1, V2, V3, and then added 5s.	
21	Motor overheating	01	Exist input signal at motor overheating input point	
22	Motor reverse failure	01	Slip reverse for consecutive 0.5 seconds (upward speed feedback < -150mm, downward speed feedback->150mm)	
		02	Under the unlocking and slipping mode (ARD and F49=3), the reverse slipping phenomenon occurs for 0.5 seconds (speed feedback <-500mm on the top and >500mm on the bottom).	
23	Elevator overspeed failure	01	Protect when the given speed is less than 1m / s, allowable speed≥ given speed +0.25 m/s and last over than 0.2s. Or protect when the given speed is greater than 1m/s, allowable speed= given speed *1.25 and last over than 0.1s	Record 6 reference and feedback datas, and it can record 3 groups most
24	Elevator over-low speed	01	Failure 24 reported when speed feedback value is less than allowable speed for 0.5 seconds When the given speed is less than 0.5m/s, allowable speed= given speed -0.25 m/s When the given speed is greater than 0.5m/s, allowable speed= given speed *0.5	
27	Up leveling sensor failure	01	When the elevator goes up, the upper flat floor switch does not change during the OFF period	
		02	After high-speed operation stops, the up leveling sensor doesn't acted	The action times of down leveling switch during operation
		03	Up leveling sensor action distance is greater than valid protection distance. When the leveling spile length is less than 300mm: maximum protection distance for effective action = 300mm*4; When the leveling spile length is greater than 300mm: maximum protection distance for effective action = leveling spile length *4	The action distance of up leveling sensor

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
		04	The distance that the up leveling sensor haven't acted is greater than maximum invalid protection distance. When the top floor is less than 3: the maximum invalid action protection distance = maximum floor height * 1.5 When the top floor is greater than 3: the maximum invalid action protection distance = maximum floor height * 2.5	The distance that up leveling up sensor have not acted
		05	After elevator up going and traveling over top floor, when re-leveling, when down leveling turn from off state to on state, the up leveling switch have not acted.	
28	Down leveling sensor failure	01	When the elevator goes up, the upper flat floor switch does not change during the OFF period.	
		02	After high-speed operation stops, the down leveling sensor doesn't acted	The action times of up leveling switch during operation
		03	Down leveling sensor action distance is greater than valid protection distance. When the leveling spile length is less than 300mm: maximum protection distance for effective action = 300mm*4; When the leveling spile length is greater than 300mm: maximum protection distance for effective action = leveling spile length *4	The action distance of down leveling sensor
		04	The distance that the down leveling sensor haven't acted is greater than maximum invalid protection distance. When the top floor is less than 3: the maximum invalid action protection distance = maximum floor height * 1.5 When the top floor is greater than 3: the maximum invalid action protection distance = maximum floor height * 2.5	The distance that down leveling up sensor have not acted
		0.5	After elevator down going and traveling over bottom floor, when re-leveling, when up leveling turn from off state to on state, the up leveling switch have not acted.	
29	AFE fault	01	AFE Fault input point action	
30	Leveling position error is too large	01	When car stops the leveling positon error would be detected, and this fault will be reported when the error detected is overpass than the F146 setting value.	
32	Safety loop disconnected during operation	01	High voltage point of safety loop disconnected during operation	
		02	Low voltage point of safety loop disconnected during operation	
35	Brake contactor contact point fault	01	Adhesion of brake contactor: the main board has no driving signal against the brake contactor, but the input detection point has an input signal, and the brake switch has an input	
		02	Non-closing of the brake contactor: the main board has a driving signal to the lock brake contactor, but there is no input signal from the input detection point, and no input from the lock switch	
		03	Brake detection wiring is broken: the main board has a driving signal to the brake contactor, and the brake switch has an input signal, but there is no input signal at the input detection point	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
		04	Short connection of brake detection wire: the main board has no driving signal to the brake contactor, and the brake switch has no input signal, but the input detection point has input signal	
36	Output contactor contact fault	01	Motherboard has no drive signal to main circuit contactor, but input signal is detected at input testing point (adhesion failure)	
		02	Motherboard has drive signal to main circuit contactor, but input signal is not detected at input testing point (non-adhesion failure)	
37	Door-lock contactor contact failure	01	The high voltage test point of door lock does not exit, but low voatage test point exit. Adhesion fault	
		02	The high voltage test point of door lock exit, but low voatage test point does not exit. Non-pickup fault	
		03	Door lock high pressure detection point, low pressure detection point, no suction failure	
38	Brake switch failure	01	Lock switch adhesion: the main board has no driving signal to the lock contactor, and no input signal to the input detection point, but the lock switch has input	
		02	The switch does not lock: the main board has the driving signal to the lock contactor, and the input detection point has the input signal, but the lock switch has no input	
40	Run signal failure	01	The control part of the AIO sends out run signal, but does not receive the run signal feedback from the drive part	
		02	When the elevator running, the running signal of inverter lost	
41	star sealing fault detection	01	The star sealing input and output points are inconsistent	
42	Deceleration switching action failure	01	Upward overtravel and the lower level force slow switch act at the same time, or Downward overtravel and the upper level force slow switch act at the same time	
45	Pre-opening relay detection fault	01	The output of short-connect door lock relay is inconsistent with the detection input of short-connect door lock for more than 2s. Short-connect door lock relay has no output, but short-connect door lock detection has input (adhesion).	
		02	Short interlock relay has output but short interlock detection has no input;(no suction)	
		03	Short lock failure: when the door loop detects the output short lock, no closure of the master lock is detected within 2S	
		04	both flat layers are not in the gate area for 1S, and the gate area is protected by adhesion	
		05	When the car is stopped, for the first time, two flat layers are in the gate area, not lasting for 2S, 3 times in a row, fault maintenance; Rush out of the door area and return, the input point of the door area will not move, after returning to the flat layer, break the power supply relay to open the door ahead of time, and then restore, no, direct fault protection	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
49	Communication failure	01	Communications failure between drive part and control part	
50	Parameter reading error	01	Power on to read the main control board parameters failure	
		02	CPU EEPROM check error	
		03	CPU Flash check error	
51	UCMP fault	01	1. Open the door in advance or open the door and then run the exit zone;(run out zone when testing UCM) 2. Walk out of the elevator when parking	
52	UCMP Parameter setting error	01	When the synchronous elevator is in automatic state, the parameter setting interface is not available, and the self-learning of elevator shaft has been completed, and the error mark of parameter setting of frequency converter UCM is received	
54	Door lock short connected failure	01	Under normal conditions, non-closing output, closing limit does not work, but the front door lock X22 or the back door X31 is not detected	
		02	Under normal conditions, non-closing output, closing limit does not act, the master lock is not in, the front door closing limit is not in, but the front door lock X22 is in	
		03	When the door lock short joint is detected, the front door has short joint;1) open the front door in place for 1 time;2) keep the front door open for more than F80, and test once before closing;3) the door lock is disconnected when the front door opens over time, and the elevator closes the door; short lock and open the door after closing the door; short lock and close the door after opening over time; short lock and open the door if the front door lock X22 has not been disconnected before closing the door;	
		04	When the door lock short connection detection, the back door has short connection;1) open the back door in place for 1 time;2) keep the back door open for more than F80, and test once before closing;3) after the back door opens over time, it is found that the door lock has been disconnected, and the elevator closes the door; after closing the door, it is short connected to the door lock and opens the door; after opening over time, the elevator closes the door; if the front door lock X22 has not been disconnected before closing the door, the rear door lock is short connected;	
		05	When the safety circuit is connected, bypass is not maintained	
		06	In normal state, non-closing output, closing limit does not work, the main door lock is not in but the rear door lock X31 is in	
60	Base electrode block failure	01	In operation, when the output contactor contact is detected disconnected, turn off the output of the intergrated controler immediately	
61	Start signal failure	01	After the brake is opened, no zero servo ending signal is received feeding back from the drive part	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
62	No speed output	01	After start, the elevator maintains the speed at 0, and the elevator does not move	
64	The brake power is seriously insufficient	01	The braking force of the locking brake is seriously insufficient, and the displacement of the small torque test exceeds 10mm	
65	Brake power is slightly low	01	The braking force of the brake is slightly insufficient, and the displacement in the big torque test is over 10mm	
67	RTC error		Motherboard hardware RTC error, only record failure, no protection	
68	The combination of self-learning flat layer insert board length and flat layer switch distance does not meet the requirements	01	When the elevator is going up, the deceleration switch of level 1 is from on to off, and the switch of both flat floors remains unchanged	
		02	Upper and lower flat layer switch states are from ON, ON to OFF, ON, and in this case, the flat layer switch is considered to be inversely connected	
		03	(length of flat layer insert board + spacing of flat layer switch)/2 is greater than 900mm.	
		04	(length of flat layer insert plate + spacing of flat layer switch)/2 is less than 100mm	
		05	(length of flat layer insert board -- spacing of flat layer switch)/2 is greater than 100mm	
		06	(length of flat layer insert board -- spacing of flat layer switch)/2 is less than 10mm	
69	The number of self-learning boards is inconsistent with the setting of the total number of elevator floors and the number of floor offset	01	Number of installed boards = preset total number (F11) - offset number of real layers (F10); However, if the total number of installed boards is different from that calculated by the above formula, the system records no. 69 fault	
		02	The maximum floor height is more than 8 meters	

7.2 Drive system faults

Table 7.2 Drive system fault codes

Code	Fault Description	Possible Cause	Solution
71	Module protection against over-current	DC terminal with excessively high voltage	Check power grid supply and check whether rapid stop with high inertia loads and without energy consumption
		short circuit at periphery	Check whether the motor and the output wiring are short circuited, whether short circuited to ground
		Phase is open in output	Check whether it is loose between the motor and the output wiring
		Encoder fault	Check whether the encoder is damaged or the wiring is correct

Code	Fault Description	Possible Cause	Solution
		Encoder phase position error	Check the phase position of encoder
		Motor phase position error	Check the phase position of motor
		The self-learning of phase angle is not correct	Re-do the self-learning of phase angle.
		The current is not sufficient when phase self-learning	Increase the F247 current gain when phase angle self-learning
		Bad contact of hardware or damaged	Ask professional technical personnel for inspection
		Converter internal connectors loose	Ask professional technical personnel for inspection
72	ADC failure	Current sensor damaged	Replace current sensor
		Problem in current sampling circuit	Replace control board
73	Radiator overheating	Ambient temperature is too high	Reduce the ambient temperature, enhance ventilation
		Duct obstruction	Clean dust, cotton and other debris in the duct
		Fan abnormal	Check whether the power cable wiring of fan is well connected, or replace the fan with the same model
		Temperature detection circuit fault	Ask professional technical personnel for inspection
74	Brake unit failure	Brake unit damaged	Replace the corresponding driver module
		External braking resistor short circuit	Check the braking resistor wiring
75	Fuse-off failure	Current is too large to fuse	Check whether the fuse circuit is open, or whether the connection points are loose
76	Over output torque	Over-low input power voltage	Check the input power
		Motor stall or severe load mutation	Prevent occur motor stall, reduce load mutation
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Open phase at output	Check whether connection between the motor and output wiring is loose
77	Speed deviation	Acceleration time is too short	Extend the acceleration time
		Overloaded	Reduce the load
		Current limit is too low	Increase the limit value in the allowable range
78	(During accelerated running) Bus over-voltage protection	Abnormal input power voltage	Check the input power
		The motor is quick restarted again during high-speed rotation	After stop the motor, restart the motor
	(During decelerated running) bus over-voltage protection	Excessive load inertia	Use appropriate braking components
		Deceleration time is too short	Extend the deceleration time
		The braking resistor has an extremely large value or is disconnected	Connect the appropriate braking resistor
	(In constant	Abnormal input power	Check the input power

Code	Fault Description	Possible Cause	Solution
	speed operation) Bus over-voltage protection	Excessive load inertia	Use appropriate braking components
		The braking resistor has an extremely large value or is disconnected	Connect the appropriate braking resistor
79	Bus under voltage	Supply voltage falls below the minimum operating voltage	Check the input power
		Instantaneous power failure	Check the input power. When the input voltage is normal, restart after reset
		Excessive changes in input power voltage	
		The power wiring terminal is loose	Check the input wiring
		Abnormal internal switching power	Ask professional technical personnel for inspection
		Large starting current load exits in the same power system	Changes the power system to meet the specification values
80	Open phase at output	Abnormal, or omitted connection or disconnection at converter output side	Follow the operation procedures and check the connections at the output side of inverter, eliminate the omitted connection and disconnection
		Output terminal is loose	
		Motor power is too small, below 1/20 of the maximum applicable motor capacity of the inverter	Adjust inverter capacity or motor capacity
		Unbalanced output three-phase	Check whether the motor wiring is intact
			Power off, check whether the inverter output side is consistent with the features of DC side terminal
81	Motor overcurrent at low speed (in acceleration)	Low voltage in power grid	Check the input power
		Abnormal setting of the motor parameters	Set correct motor parameters
		Quick start during the motor operation	Restart after the motor stops rotating
	Motor overcurrent at low speed (in deceleration)	Low voltage in power grid	Check the input power
		Excessive load inertia	Use appropriate braking components
		Abnormal setting of the motor parameters	Set correct motor parameters
		Deceleration time is too short	Extend the deceleration time
	Motor overcurrent at low speed (in constant speed)	Load mutation during operation	Reduce the mutation frequency and magnitude of the load
		Abnormal setting of motor parameters	Set correct motor parameters
82	Encoder fault	Encoder is not correctly connected	Change encoder wiring
		Encoder has no signal output	Check the encoder and power supply
		Encoder wiring disconnected	Repair the disconnection
		Abnormal function code setup	Confirm the relevant functional configuration of the converter Encoder
83	Current detected at car stopped	Current not effectively blocked when the motor stops	Synchronous motor skid
			Ask professional technical personnel for inspection

Code	Fault Description	Possible Cause	Solution
84	Velocity reverse in operation	Reverse speed in operation	Check the external load for mutation
		Encoder is inconsistent with the motor phase sequence	Change motor or encoder phase sequence
		Motor reversal at start, and the current reaches the current limit	Current limit is too low, or the motor does not match
85	Velocity detected at stop	Brake loose, the elevator car slides	Check brake
		Encoder interfered or loose	Fasten encoder, eliminate interference
86	Motor phase sequence error	Motor wiring reverse	Reverse the motor wiring, or adjust parameters
87	Over speed in the same direction (within the maximum allowed range)	Galloping in the field-loss status of synchronous motor	Check motor
		Incorrect self study of angle of synchronous motor	Restart the self-learning
		Encoder parameter error or interfered	Check encoder circuit
		Excessive load in forward direction or load mutation	Check the external causes for load mutations
88	Over speed in the reverse direction(within the maximum allowed range)	Galloping in the field-loss status of synchronous motor	Check motor
		Incorrect self study in angle of synchronous motor	Restart self study
		Encoder parameter error or interfered	Check encoder circuit
		Excessive load in reverse direction or load mutation	Check the external causes for load mutations
89	Wrong phase sequence of UVW encoder	Problem with encoder connection or wrong parameter setting	Check the connection or change the parameters
90	Encoder communication failure	Encoder fault	Check encoder wiring and try to do encoder self study
91	Abs over-current (3-phase instantaneous value)	Motor single-phase ground short circuit	Check motor and the output wire circuit
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Encoder phase error	Check the phase of the encoder
		Motor phase error	Check the phase of the motor
		The self-learning of phase angle is not correct	Redo the self-learning of phase angle
		The current is not stuffiest while doing the self-learning of phase angle	Increase the current gain of F247 when doing self-learning
		Error of detection circuit on driver board	Replace driver board
92	Brake detection failure	No action of output relay	Check the relay control circuit
		Relay action brake is not activated	Check whether the brake power cable is loose or disconnected
		Feedback component fail to detect signal	Regulate feedback component

Code	Fault Description	Possible Cause	Solution
93	Input over-voltage	Incoming voltage is too high	Check whether incoming line voltage matches converter
		Problems with switching power supply voltage detection circuit	Ask professional technical personnel for inspection
94	UVW Encoder disconnection	Problems with encoder wiring circuit	Check whether the terminal is loose or the wire is broken or damaged
96	Encoder is not self-study	Synchronous motor fails to learn encoder angle	Make encoder self study
97	Output over-current (effective value)	Running under overload for too long time. The greater the load, the shorter the time	Stop running for a period time. If it occurs again after re-running, check whether the load is within the allowable range
		Motor stall	Check motor or brake
		Motor coil short circuited	Check motor
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Encoder phase error	Check the phase of the encoder
		Motor phase error	Check the phase of the motor
		The self-learning of phase angle is not correct	Redo the self-learning of phase angle
		The current is not suffient while doing the self-learning of phase angle	Increase the current gain of F247 when doing self-learning
		Output short circuit	Check the wiring or the motor
98	SIN/COS Encoder failure	Encoder damaged or wrong wiring	Check the encoder and the wiring
99	Missing input phase	Abnormal voltage at the input side	Check grid voltage
		Open phase on input	
		Loose terminal on input side connection	Check the input terminal wiring
100	Overspeed protection (protection against exceeding the maximum speed limit)	Encoder parameter setup error or interfered	Check encoder circuit
		Load mutation	Check causes of the external load mutation
		Overspeed protection parameter setup error	Check parameters
101	Over-current when the motor at high-speed	Low voltage power grid	Check the input power
		Load mutation when running	Reduce the load mutation frequency and amplitude
		Abnormal motor parameters setup	Set motor parameters correctly
		Encoder parameter setup error or interfered	Check encoder circuit
102	Grounding protection	Wiring connection error	Correct the wiring errors according to user manual
		Abnormal motor	Test earthing insulation before replacing the motor
		Over-current leakage of inverter output side against earthing	Ask professional technical personnel for inspection
103	Capacitance aging	Inverter capacitor aging	Ask professional technical personnel for inspection
104	External fault	Failure signal on external input	Check the external cause of the malfunction

Code	Fault Description	Possible Cause	Solution
105	Unbalanced output	Converter output side has abnormal wiring, missed wiring, or disconnection	Follow the operational rules and check the wiring of output side of inverter, eliminate ignored wiring and disconnection wiring
		Unbalanced 3-phase motor	Check motor
106	Parameter setting error	Wrongr Parameter setup	Modify the inverter parameters
107	Current sensor fault	Driver board hardware failure	Ask professional technical personnel for inspection
108	Braking resistor short circuit	Short circuited of external braking resistor	Check the braking resistor wiring
109	Current instantaneous value is too large	When Ia, Ib, Ic is not in operation, instantaneous value of 3-phase current is too large and reports alarm	Ask professional technical personnel for inspection
112	IGBT short-circuit protection	Short circuit in periphery	Check whether the motor and output wiring is short circuited, and whether short circuited to earth; check whether the brake is open, when doing the anti-slip test, the parameter could be set as a big value, and after accomplished the experiment set back the parameter as the previous value
113	Communication failure for the integrated inverter	Loose connectors inside inverter	Ask professional technical personnel for inspection
		Hardware has bad contact or is damaged	Ask professional technical personnel for inspection
114	Charging relay failure	Charging relay damaged	Ask professional technical personnel for inspection
		The instantaneous voltage drop of 3-phase input power exceeds 46V	Check the cause for input voltage drop
115	I2t instantaneous value over current	Check whether the temperature rise of radiator is too high, whether the ambient temperature is too high; check whether the fans have problem	Ask professional technical personnel for inspection
116	I2t effective value over current	The motor keeps running with over power	Check the cause of keeping running with over power
117	Control board hardware failure	control panel hardware failure driver control panel hardware mismatching check driver control panel model	Check the type of drive panel
119	Brake failure	Brake failure check brake device if the cage moves more than 2CM accidentally	Check brake
120	BTM torque tracking fails	BTM torque tracking fails to track the fault. The given torque and feedback torque become too different, and the torque deviation exceeds 10%	The output phase

VIII. Seven-segment display manipulator instruction

The appearance and meaning of 7-segment display manipulator are shown as follows.

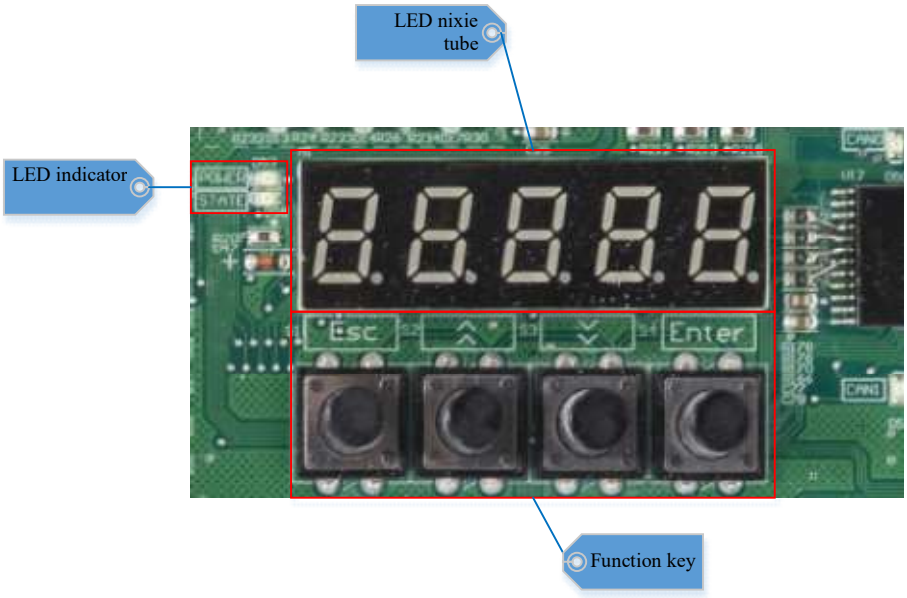


Figure 8.1 Meanings of 7-segment manipulator parts

8.1 LED indicator

In service, related indicators on the main board, as in debugging, may be used to monitor the operating modes of communication and each hardware module. The following table gives the specific description.

Table 8.1 D50~D58 meanings

Code	Display	Meaning	Remark
D50	CAN0	Serial command, external call communication	Indicate the condition of communication for CAN and 484 Flash: with communication OFF: without communication
D51	CAN1	Parallel, group control communication	
D52	485	Community monitoring, IOT communication	
D53	POWER	Power supply (powering the chip)	ON: normally supply DC+3.3V to main board chip
D58	STATE	State, CPU operating state	Quick flash: normal Mid speed: in self-learning Low speed: elevator failure

8.2 Function key

There are 9 buttons at the bottom of manipulator. Their functions see the following table.

Table 8.2 Description of functions

Button	Name	Function
	UP button	1. Shift one menu left for function selection 2. Shift one item up for menu viewing 2. Increase the current digit by 1 for data input
	DOWN button	1. Shift one menu right for function selection 2. Shift one item down for menu viewing 2. Decrease the current digit by 1 for data input
	Esc button	1. Cancel the data enter 2. Shift one item up for menu viewing
	Enter button	1. Enter to view the menu items 2. Change the parameter when viewing it 3. Save the entered data

8.3 Operation of manipulator

8.3.1 Menu structure

The main menu structure is shown in the following figure. Due to limitations of 7-segment and button structure, the operation interface uses the Level 1 menu structure. Switching among menus may be realized by pressing “UP” and “DOWN” buttons.

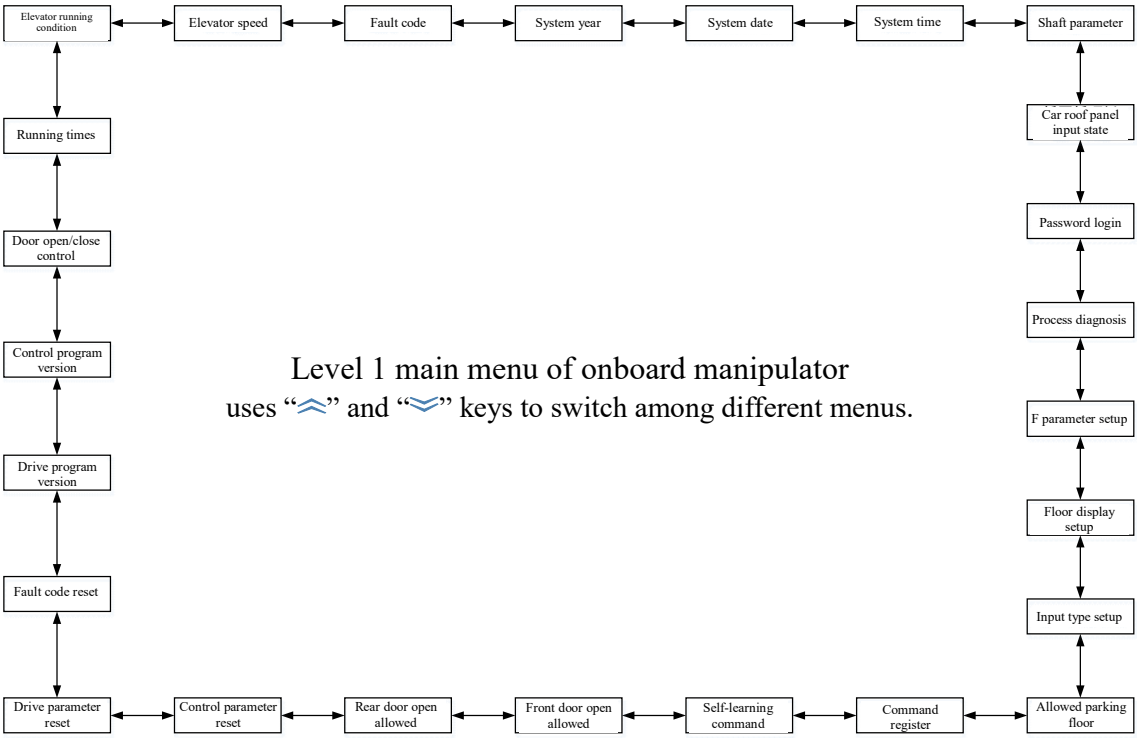


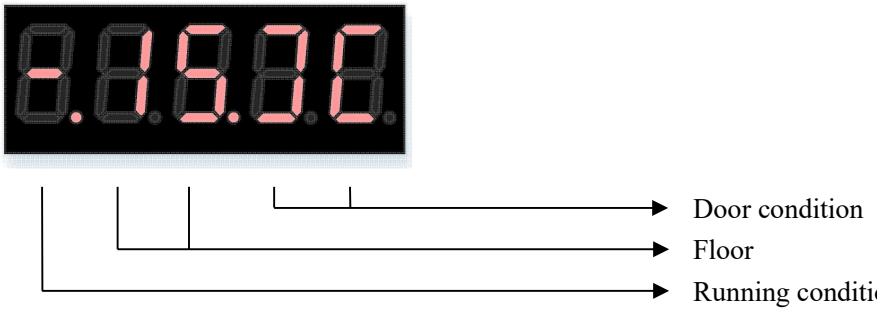
Figure 8.2 Menu structure

8.3.2 Operating instruction of each menu switched by UP and DOWN buttons

Press the UP or DOWN button to switch among menus under the Level 1 main menu interface. The first one displayed at the time of each power-on is elevator running condition interface. Each menu is detailed as follows:

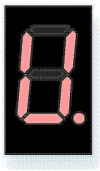
1. Elevator running condition (this menu is displayed after power-on)

- Running condition: After elevator is powered on, the onboard manipulator will display the elevator running condition interface.



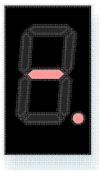
In this menu, the basic condition of elevator may be displayed, including running condition, floor located, and door condition.

Under the running condition item:



Indicate elevator running up

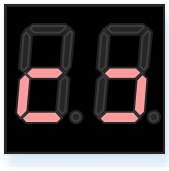
Indicate elevator running down



Indicate elevator stop

The located floor is expressed with double-digit decimal numbers.

Under the door condition item:

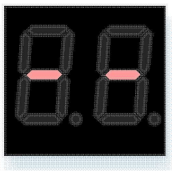


Indicate door opening

Indicate door open in place

Indicate door closing

Indicate door close in place



Indicate door lock unclosed

- Inspection: When onboard manipulator is in the elevator running condition under main interface, click Enter to enter the inspection condition view, and then press the aforesaid button to return to main interface.

Under the inspection view interface, the nixie tube displays “Ins. codes” (running conditions at inspection) which are explained as follows:

Table 8.3 Description of “Ins. codes”

0~7 corresponds to codes under the stop condition							
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Stop with running conditions satisfied	Door lock unclosed	Xmy unreleased	Xmb unreleased	Band brake switch unreleased	Operation failed due to motor overheat	Action at upper limit	Action at lower limit
8~14 corresponds to codes under the running condition							
8	**9**	**10**	**11**	**12**	**13**	**14**	
Running direction pressed	Kmy pick-up	Enable given	Direction given	Converter operated	Band brake opened	Speed given	

- Self-learning: Press Enter for 10 s in the inspection mode to enter the shaft self-learning. This interface is displayed flashing.

2. Shaft self-learning command

When entering the menu, display is as shown in above figure.

Self-learning command

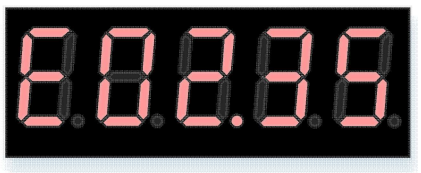
For shaft self-learning, press “Enter” and the last digit begins to flash; press “UP” button, 0 changes to 1; press “Enter” to confirm, as shown in above figure, the elevator starts the shaft self-learning. If setting the parameter to 2, asynchronous motor parameter self-learning will be carried out.

Self-learning command can be changed only if you have login permission; if not login, press “Enter” to go to “Login” menu when you change the parameter.

3. Elevator speed

This menu displays the current running speed of elevator, in m/s. As above figure, the current speed displayed is 1.75 m/s.

4. Fault code



Fault code

Fault code serial no.

The integrated controller can save up to 20 fault codes. The serial no. of the last fault code is 00. Use ESC to view these fault codes. Press “Enter”, display the fault date; press “UP”, “DOWN” buttons to check the time and floor that fault occurred. Press “ESC” to quit.

5. System year

As meant in above figure: the year 2010. “Y” is the abbreviation of year. When change is required, press “Enter”, 2 digits in the lowest order start to flash. Then, use the “UP”, “DOWN” buttons to change them, and press “Enter” to confirm the change.

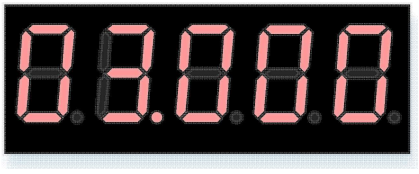
6. System date

As meant in above figure: March 26. “d” is the abbreviation of day. When change is required, press “Enter”, the digit in the lowest order starts to flash. Use the “DOWN” button to select the digit to be changed; the selected digit starts to flash. Then, use the “UP” button to change it, and press “Enter” to confirm the change.

7. System time

As meant in above figure: 16:30. “T” is the abbreviation of time. Please note that “T” displayed in the integrated controller is always as that in the above figure due to the confinement of 7-segment code. When change is required, press “Enter”, the digit in the lowest order starts to flash. Use the “DOWN” button to select the digit to be changed; the selected digit starts to flash. Then, use the “UP” button to change it, and press “Enter” to confirm the change.

8. Shaft parameters



The parameter shows the floor shaft data, length of leveling plate, distance of leveling switch, and deceleration switch position.

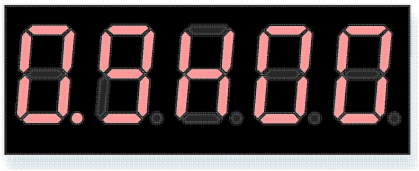
The specific operation is given as follows: For example, P02, the screen displays the above “P- 02”, wait for one second, it will display 03.000, the value of P02 parameter; as above figure, you will see “03.000”. Afterwards, “P- 02” and “03.000” are displayed alternatively, with each lasting for about one second. The parameter shows that the height of floor 2 to floor 1 is 3 m. Each parameter is defined as follows.

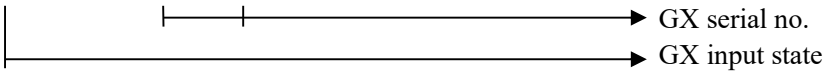
Table 8.4 Meaning of shaft parameters

No.	Meaning
P01-P64	Floors 1-64 shaft data
P65	Leveling plate length
P66	Leveling switch center distance
P67	Floor 1 Up deceleration switch distance
P68	Floor 2 Up deceleration switch distance
P69	Floor 3 Up deceleration switch distance
P70	Floor 4 Up deceleration switch distance
P71	Floor 1 Down deceleration switch distance
P72	Floor 2 Down deceleration switch distance
P73	Floor 3 Down deceleration switch distance
P74	Floor 4 Down deceleration switch distance

After “Enter” is pressed, the parameter number flashes; use the “UP”, “DOWN” buttons to select the parameter to be viewed. After selection is finished, press Enter again to return to previous interface to check the parameter.

9. Car roof panel input state



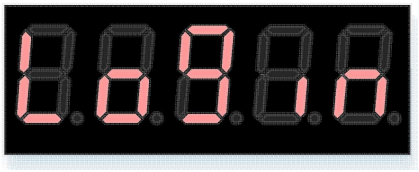


As meant in above figure: GX0 has no input. Press Enter, GX serial number flashes; press “UP”, “DOWN” to select the GX serial number ranging from 0 to 15. After GX of corresponding number is selected, the digit in the highest order shows whether or not there is valid input at this input terminal (0 represents no valid input, 1 represents valid input).

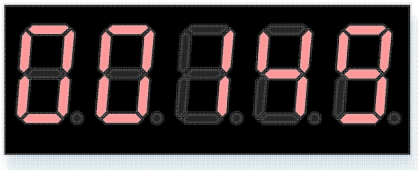
HX serial no.
HX input state

As meant in above figure: HX0 has no input. Press Enter, GX serial number flashes; press “UP”, “DOWN” to select the HX serial number ranging from 0 to 15. After HX of corresponding number is selected, the digit in the highest order shows whether or not there is valid input at this input terminal (0 represents no valid input, 1 represents valid input).

10. Password login



Press “Enter” to enter the menu and display the following figure:

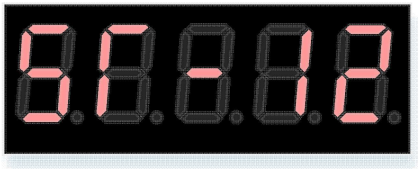


Enter the password; the password as displayed in above figure is 149.

In the login menu, you will see “login”. Press “Enter”, the digit in the lowest order of LED starts to flash; use “UP” button to select this digit. Use “DOWN” button to select the position where the numeral is entered, the selected one will flash, indicating that the digit input state is entered; then, use “UP” button to select the digit to be entered. After entering is finished, press “Enter” to finish the login. If the entered password is correct, the word “login” will be displayed after pressing “Enter”; if it is wrong, the password input state will remain after pressing “Enter”. Press “ESC” to quit.

Please note, only elevator condition and parameters can be browsed if not login. Only in login state can you be authorized to change the parameters.

11. Process diagnosis



Status code

This menu shows the current condition of elevator. It is represented by one 2-digit status code. The

meaning of status codes is given in the following table.

Table 8.5 Meaning of status codes

S.N.	Description
0	Safety circuit disconnected
1	Elevator failure
2	Motor overheat
3	Elevator overload
4	Safety edge action
5	Door open button action
6	Door lock short circuit/door open limit action
7	Elevator door opening
8	Elevator door closing
9	Door close limit without door lock
10	Upward limit
11	Downward limit
12	Door lock closed, meeting the running conditions
13	KMY contact inspecting
14	KMB contact inspecting
15	In zero speed servo
16	Elevator by pass
17	Elevator running
18	Elevator door lock disconnected
19	Shaft learning not finished
20	Frequency converter enabling check
21	Shaft learning finished
22	Vibration data transmitting (not used generally)
23	External call or command action
24	Motor self-learning
25	Backup power supply
26	Converter parameter reading and writing
27	Base blocking

12. F parameter setup

Because F parameter has many values, its serial number is displayed in three digits. Moreover, the parameter itself needs to be displayed in multi-digit. Therefore, special treatment is adopted in design by using alternative display of F parameter. The specific operation is given as follows: use “ESC” to select the parameter to be viewed. For example, F3, the screen displays the above “F-003”, wait for one second, it will display 1.100, the value of F3 parameter; as above figure, you will see “1.100”. Afterwards, “F-003” and “1.100” are displayed alternatively, with each lasting for about one second. Press “Enter”, the digit in the lowest order of LED starts to flash; use “UP” button to select this digit. Use “DOWN” button to select the position where the numeral is entered, the selected one will flash, indicating that the digit input state is entered; then, use “UP” button to select the digit to be entered; press “Enter” to finish the parameter change; the selected digit stops flashing.

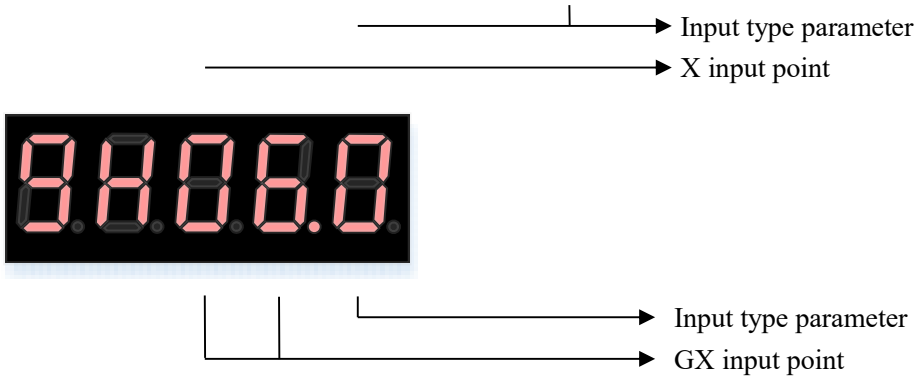
F parameter can be changed only if you have login permission; if not login, press “Enter” to go to “Login” menu when you change the parameter.

13. Floor display

The parameter is used to set the floor display code of each floor. The specific operation is given as follows: use “ESC” to select the floor to be viewed. For example, floor 1, the screen displays the above “FLr-01”, wait for one second, it will display the display code of the floor; as above figure, you will see “1”. Afterwards, “FLr-01” and “1” are displayed alternatively, with each lasting for about one second. Press “Enter”, the digit in the lowest order of LED starts to flash; use “UP” button to select this digit. Use “DOWN” button to select the position where the numeral is entered, the selected one will flash, indicating that the digit input state is entered; then, use “UP” button to select the digit to be entered; press “Enter” to finish the parameter change; the selected digit stops flashing.

The floor display parameter can be changed only if you have login permission; if not login, press “Enter” to go to “Login” menu when you change the parameter.

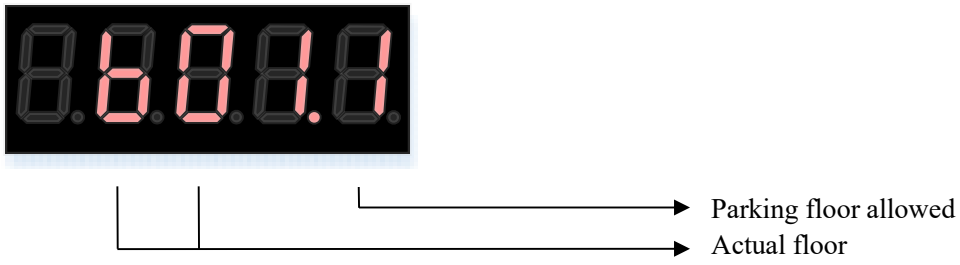
14. Input type



Press “Enter”, the input number flashes; use “UP” and “DOWN” buttons to select the X or GX or HX input point to be changed. Press “Enter” again, the parameter value starts to flash; use “UP” and “DOWN” buttons to set the parameter, and press “Enter” to confirm it. “1” represents NC input, and “0” represents NO input. Please note that “X”, “G” and “H” displayed in the integrated controller is always as those in the above figure due to the confinement of 7-segment code. Moreover, please pay attention to make clear distinguish between “X” and “H”, since they have very similar display.

Input type can be changed only if you have login permission; if not login, press “Enter” to go to “Login” menu when you change the parameter.

15. Allowed parking floor

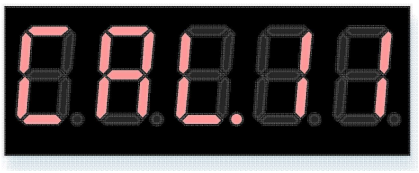


Press “Enter”, the actual floor number flashes; use “UP” and “DOWN” buttons to select the floor to

be changed. Please note, the floor mentioned here is the actual floor (or the control floor). Press "Enter", the parameter starts to flash; use "UP" and "DOWN" buttons to set the parameter, and press "Enter" to confirm it. "1" represents parking allowed, and "0" represents parking prohibited.

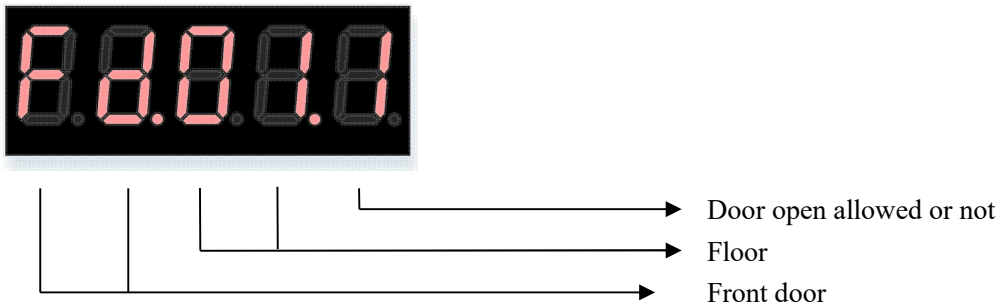
Allowed parking floor can be changed only if you have login permission; if not login, press "Enter" to go to "Login" menu when you change the parameter.

16. Command register



Press "Enter", the floor number flashes; use "UP" and "DOWN" buttons to select the floor to be sent with command; press "Enter" again to confirm the command register

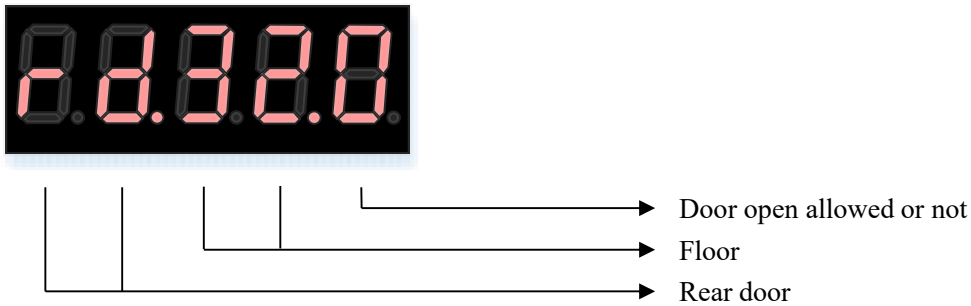
17. Front door open allowed



As meant in above figure: shield the floor 1 front door open allowed. "Fd" is the abbreviation of Front Door. Press "Enter", the floor number flashes; use "UP" and "DOWN" buttons to view the front door open allowed parameter of corresponding floor. If change is needed, press "Enter" again, the digit in the lowest order starts to flash; use "UP", "DOWN" buttons to change it to 0 or 1, and press "Enter" to confirm the change (0 is to shield the front door open allowed function, 1 is to enable the front door open allowed function).

Front door open allowed parameter can be changed only if you have login permission; if not login, press "Enter" to go to "Login" menu when you change the parameter.

18. Rear door open allowed



As meant in above figure: shield the floor 1 rear door open allowed. “rd” is the abbreviation of Rear Door. Press “Enter”, the floor number flashes; use “UP” and “DOWN” buttons to view the rear door open allowed parameter of corresponding floor. If change is needed, press “Enter” again, the digit in the lowest order starts to flash; use “UP”, “DOWN” buttons to change it to 0 or 1, and press “Enter” to confirm the change (0 is to shield the rear door open allowed function, 1 is to enable the rear door open allowed function).

Rear door open allowed parameter can be changed only if you have login permission; if not login, press “Enter” to go to “Login” menu when you change the parameter.

19. Control parameter reset

This menu is to realize the reset of control parameters F0~F199. Please note that the control parameter reset is only valid if the login level is more than or equal to 2; if the level is not qualified, no effect will be provided when pressing “Enter”; if it is qualified, press “Enter” to enter the authentication code input menu (the authentication code setting is to prevent misoperation. This code is always 5678). If the code is correct, press “Enter” and reset the control parameters.

When the code is entered, shift using “DOWN” button, and use “UP” button to select the digit value.

20. Drive parameter reset

This menu is to realize the reset of drive parameters F200~F255. Please note that the drive parameter reset is only valid if the login level is more than or equal to 2; if the level is not qualified, no effect will be provided when pressing “Enter”; if it is qualified, press “Enter” to enter the authentication code input menu (the authentication code setting is to prevent misoperation. This code is always 5678). If the code is correct, press “Enter” and reset the drive parameters.

When the code is entered, shift using “DOWN” button, and use “UP” button to select the digit value.

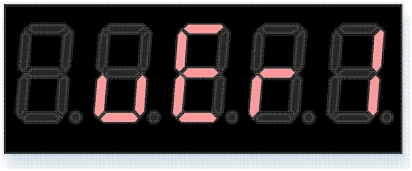
21. Fault code reset

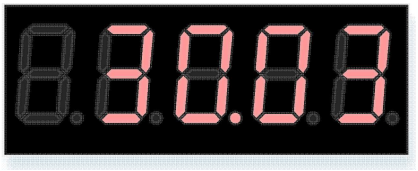
This menu is to realize the fault code reset. Please note that the fault code reset is only valid if the login level is more than or equal to 2; if the level is not qualified, no effect will be provided when

pressing “Enter”; if it is qualified, press “Enter” to enter the authentication code input menu (the authentication code setting is to prevent misoperation. This code is always 5678). If the authentication code is correct, press “Enter” and reset the fault code.

When the authentication code is entered, shift using “DOWN” button, and use “UP” button to select the digit value.

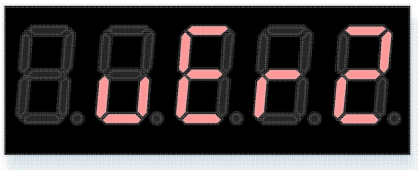
22. Drive program version





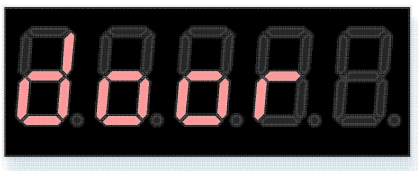
This menu displays the program version number of integrated controller drive section. Wait for one second, the screen displays the program version 30.03 of drive section, as shown in above figure. Afterwards, “VER1” and “30.03” are displayed alternatively, with each lasting for about one second.

23. Control program version



This menu displays the program version number of integrated controller control section. Wait for one second, the screen displays the program version 01 of control section, as shown in above figure. Afterwards, “VER2” and “01” are displayed alternatively, with each lasting for about one second.

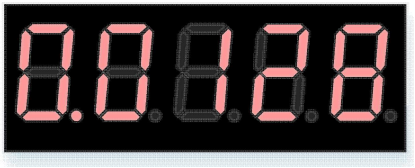
24. Door open/close control



When Bit3 of parameter F165 (door open/close control) is set to 1, the door open/close function of LED manipulator is enabled; in this interface, press “Enter”, the displayed interface flashes; press

"UP" button, the system will deliver the door open signal; press "DOWN" button, the system will deliver the door close signal.

25. Elevator running times



For running times, "." does not represent the decimal point, which is used to distinguish other interfaces.

As shown in above figure, the elevator has run 128 times; if 1.0128 is displayed, it represents running 10128 times.

If the times exceed 99999, high 5-digit and low 5-digit are displayed alternatively over a period of 1 second.

High digit:

Low digit:

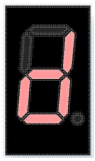
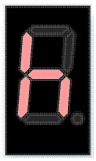
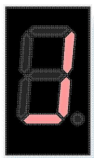
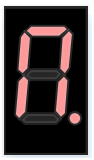
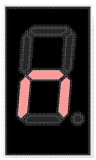
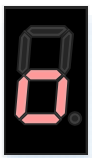
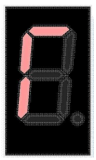
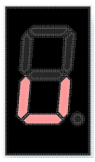
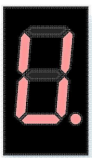
As shown in above figures, the running times is 10000 00010.

8.4 Legends of LED displayed numbers and letters

Due to LED structure limitation, it is quite difficult to understand the displayed numbers and letters, so the following check list of displayed legends and meanings is given.

Table 8.6 Check list of 7-segment displayed legends and meanings

Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning
	0		1		2		3		4		5

Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning
	6		7		8		9		A		B
	C		D		E		F		G		H
	I		J		K		L		M		N
	O		P		Q		R		S		T
	U		V		W		X		Y		Z

IX. Elevator debugging guide

9.1 Simple Commissioning Guide

A new elevator equipped with AS380S series integrated elevator drive control cabinet manufactured by Shanghai STEP Electric Corporation. Its debugging process in electrical control and drive aspects is as follows.

9.2 Check before Power-on

After installation of electrical control systems, electrical parts must be checked:

1) Check the connection of all parts according to the user manual and electrical schematic diagram.

2) Check if the strong current part and the weak current part are connected. Check the resistance between various voltage circuits and the grounding resistance with ohm grade of a multimeter to make sure that they are up to ∞.

3) Please carefully check whether the power incoming line of the control cabinet and motor connections are correct to prevent integrated drive control cabinet of AS380S elevator from being burnt after power-on.

4) Check if the control cabinet case, motor case, lift car grounding wire and hall door grounding wire are reliably and securely grounded to ensure personal safety.

▲ Note: Ensure one-point grounding of cabinet case and motor case

9.3 Power-on and Check

9.3.1 Confirmation before Power-on

1. Check the control cabinet for grounding short circuit before power-on:

1) Input power line three-phase grounding;
2) Motor line three-phase grounding;
3) Terminal 220V grounding;
4) Communication line grounding;
5) Encoder line grounding.

Aforesaid items are to be eliminated in case of short circuit

2. Grounding check: (Make sure that the following items are reliably grounded)

1) Control cabinet grounding;
2) Motor grounding;
3) Lift car grounding;
4) Door motor grounding;
5) Trough grounding;
d) Encoder shield control cabinet grounding;
e) Encoder shield motor grounding.

Note: single terminal grounded for asynchronous motor encoder shield; both terminals grounded for synchronous motor Encoder shield.

3. Check communication lines, encoder cable and power line wiring: (Please confirm if the site meets the following requirements, if not, please correct):

1) Shaft communication line is twisted with twist distance <35cm
2) Lift car communication line is twisted pair with twist distance <35cm
3) Group control communication line of parallel connection is a twisted pair line with twist distance <35cm (only limited to parallel connection or group control elevator)
4) Encoder lines and power lines go separate trunking
5) Communication lines and power lines go separate trunking

6) Group control communication lines in parallel connection and power lines go separate trunking (only limited to parallel connection or group control elevator)

9.3.2 Check after Power-on

1. Close the main power switch. If the green light on the phase sequence relay KAP is on, the phase position is correct. If the green light is not on, shut off the main power supply, and swap any two-phase positions and then power on again.
2. Check all terminal voltage of the isolation transformer TC0 in the control cabinet, and see if they are within the nominal range.
3. Proceed with the following steps if aforesaid steps are correct:
   1) Close the fuse **Fun** (n = 1, 2, 3 ...);
   2) Close the door open/close power control switch; switching power supply TPB is powered on, and the mainboard is electrified to run.

   Each terminal voltage of switching power supply is as follows:

Table 7.2 Terminal Voltage of Switching Power Supply

Terminal	L~N	24V~COM
Voltage	220±7%VAC	24.0±0.3VDC

   3) Reset the emergency stop switch of the control cabinet to connect safety loop, and turn on the LED lights corresponding to the mainboard .
   4) Check the following loops:
   - Check if the door lock loop is normal;
   - Check if the leveling switch signal is normal;
   - The elevator status on the portable programmer is to be displayed as “Maintenance”.

   Check any abnormality for correction.

9.4 Setting of System Basic Parameters and Self Study of Motor Parameters

9.4.1 Setting of System Basic Parameters

Firstly, set the system basic parameters in the following table correctly with the special portable LCD Manipulator, and then make commissioning as described in the following sections. For each new system, it is recommended to use the special portable LCD manipulator to make a parameter resetting before parameter setting.

Parameter resetting methods are stated as follows:

1. **The elevator is stopped;**
2. **Find “Parameter Resetting” interface on the portable manipulator;**
3. **Align the cursor with "parameter reset" command and press Enter key, the system will complete parameter resetting immediately**

After parameter resetting, all the parameters are to be changed into factory default values. Set the basic parameters on the basis of parameter resetting; other parameters not set are to be provided the factory default values to ensure normal and reliable operation of the system.

Table 9.3: System Basic Parameters

No.	Designations	Default Values	Range	Unit	Remarks
F06	Elevator rated speed	1.750	0.100~10.00	m/s	
F09	Parking floor	1	1~64	×	
F10	Offset floor	0	0~64	×	
F11	Floor number	18	2~64	×	
F12	Inspection speed	0.250	0~0.630	m/s	
F23	Group control mode	0	0~3	×	
F25	Input Type 1 (normal open or normal closed configuration for X0 ~ X15 input point)	819	0~65535	×	
F26	Input Type 2 (normal open or normal closed configuration for X16 ~ X25 input point)	2	0~65535	×	
F27	Lift car board input type (normal open or normal closed configuration for GX0 ~ GX15 input point)	0	0~65535	×	
F28	Car top board input type (normal open or normal closed configuration for HX0 ~ HX15 input point)	327	0~65535	×	
F182	Deceleration switch series	0	0~10	×	
F183	Shaft self learning speed	0.800	0~1.000	m/s	
F202	Motor type	0	0/1	×	0: asynchronous; 1: synchronous
F203	Motor rated power	As per inverter parameters	0.40~160.00	KW	
F204	Motor rated current	As per inverter parameters	0.0~300．0	A	
F205	Motor rated frequency	50.00	0.00~120.00	Hz	
F206	Motor rated revolution	1460	0~3000	rpm	
F207	Motor rated voltage	As per inverter parameters	0.~460	V	
F208	Motor pole number	4	2~128	×	
F209	Motor rated slip frequency	1.40	0~10.00	Hz	
F210	Encoder type	0	0/1/2	×	0:incremental Encoder 1:SIN/COS Encoder 2: Endat Encoder
F211	Encoder pulse number	1024	500~16000	PPr	

Note: Before debugging, the basic parameters above must be correctly set; the basic parameters of the motor can be input based on nameplate; please refer to Chapter 7 for the parameter setting method and detailed definition in view of practical conditions on the site.

9.4.2 Self study of Motor Parameters

No motor parameters self study for the synchronous motor is required. As integrated drive control cabinet of AS380S series elevator adopts the most advanced and unique driver technologies that can automatically obtain encoder phase angle data, there is no need for motor auto-tuning of encoder phase angle.

Note: The drive controller ofAS380S series elevator AIO is used to control synchronous motors, and every time after power-on, it will automatically capture Encoder information at its first running, which takes 2 seconds or so. Therefore, the given running signal at this time is slightly later than usual. Please do consider this detail in the design for this control system, to avoid unnecessary failure.

For the asynchronous motor, if the on-site motor parameters are confirmed to be very accurate, in particular if the F209 (motor rated slip frequency) parameters are confirmed to be accurate, the following self study of motor internal characteristic parameters will not be necessary. However, if the on-site motor parameters are not accurate enough or for the purpose of ensuring excellent operating characteristics of the system, self study can be carried out on site regarding the motor internal operating parameters. Specific methods are as follows:

1) Connection between integrated drive control cabinet of AS380S series elevator and motor as well as AIO and encoder has been successfully completed;

2) Ensure correct power-on for AIO;

3) Confirm that the safety loop and door lock loop are in a normal connected state;

4) The auto/inspection (or emergency power operation) switch is in the position of inspection (or emergency power operation);

5) Select "asynchronous motor self learning" command by seven-segment code display manipulator or portable LCD Manipulator, and then press the Enter key;

6) AIO starts static self learning: The main contactor between AIO and the motor will automatically suck; AIO obtains internal characteristics parameters of the motor by applying test current on the motor. However, the brake contactor will not suck; whereas the motor is also unavailable for rotation;

7) Self learning of motor parameters is to be completed approximately 30 second later; whereas main contactor is to be released.

Check the following major items if self learning does not work;

1) If the safety loop and the door lock loop are connected. If not, the main contactor will not suck, and it is impossible to complete the self learning;

2) If encoder wiring is correct and if phase A and B are reversed;

3) If motor parameters are correctly set.

9.5 Test Run of Slow Car

9.5.1 Inspection of Engine Room and Preparations for Express Car

1. Issues to be confirmed prior to slow car run in engine room

1) Inspection (or emergency power operation) switch of the control cabinet is switched over to "**Inspection**"(or emergency power operation) position, and car top Inspection switch is switched over to "**normal** " position;

2) Safety loop and door lock loop work properly. **Remember not to have lock shorted**;

3) Encoder is properly installed and wired;

4) When the integrated drive control cabinet of AS380S elevator displays normally, check if its parameters are set correctly, and if manual encoder shows that the elevator is in a status of "Inspection";

5) Connect correctly the tractor brake line onto the terminal in the control cabinet;

6) The upper and lower deceleration switches are correctly wired;

7) Inspection priority circuit on the car top is correctly wired;

2. Slow run of engine room

Once the engine room slow car meets the operating conditions, press the upward (downward) button on the control cabinet, and the elevator should go upward (downward) at a preset inspection speed.

1) Check if the elevator follows the right direction when it goes up or down. If it is in the wrong direction, check if the up and down buttons are correctly wired at first. T1.3on the connector board of mainboard for integrated cabinet is to be in connection with upward button signal of inspection handle; whereas T1.4 is to be in connection with downward button signal of inspection handle. If wiring is correct, just change the F234 motor phase sequence parameters (from 0 to 1or from 1 to 0).

2) When the slow car goes upward or downward, if the motor feedback speed as displayed by AIO is unstable or significantly deviated from the set value, just check the wiring between encoder and the mainboard:

a) If the connecting line used is correct. If the encoder sends a differential signal, just use shielded twisted-pair cable; otherwise, use common shielded cable

b) If wiring is reasonable. The encoder cable and power lines should not go trunking together, and must be strictly separated;

c) Check if the shielding lines and net are reliably grounded.

3) Check if the upper and lower leveling switches are correctly wired: When the elevator goes up slowly and bypasses through the leveling floor, it should be confirmed that X7 (down leveling switch) acts before X6 (up leveling switch). Otherwise, the shaft cannot complete self study successfully. In such case, wires of the two switches connected to the mainboard are to be exchanged.

Note: Under many circumstances, slow running is an emergency power operation other than an inspection operation. At this point, the safety gear switch, speed limiter switch, upward speed protection switch, upper and lower terminal limit switch and buffer reset switch in the safety loop are to be shorted during slow run, to which particular attention should be paid. It is recommended that the time and the distance of engine room emergency running will not last too long; furthermore, do not run the lift to the terminal position.

9.5.2 Car Top Inspection Operation

It is applicable to proceed with car top inspection once engine room slow run becomes normal. The inspection speed can be adjusted lower appropriately during the first commissioning. After the operator enters the car top:

1) Firstly, set immediately the car top Auto / Inspection switch to Inspection position, and

confirm that the upward and downward buttons in the control cabinet of the engine room do not work at this moment.

2) Jog the upward and downward buttons by car top, and confirm the button direction is the same with the lift car running direction.

3) The operator is requested to operate the elevator to the car top for test run by one cycle, carefully observe the surrounding area of the lift car, and confirm that there is no obstruction for the lift car in the entire shaft

4) By inspection operation to the car top, confirm that the shaft terminal deceleration switch acts correctly, and its movement position is correct.

5) By inspection operation to the car top, confirm that the shaft leveling switch and leveling spiles are installed correctly, each leveling switch at each leveling position acts correctly.

9.5.3 Check of CAN Communication Lines and Setting of 04 Board Address

1. Check of communication terminal resistance:

1) Make sure that the terminal resistance between the CAN 1 communication port TXA + and TXA- is 60 ohms (there is a respective jumper terminal resistance of 120 ohms inside the car and outside the hall).

2) Confirm that the terminal resistance of CAN2 communication port TXA1 +, TXA1-parallel connection or group control is 60 ohms (for parallel connection or group control elevator, the terminal resistance at mainboard CAN2 port is to be inter-connected.)

2. Setting of SM-04 board address

Please start from the lowest order to set the SM-04 board address from 1 until the top end. Set the SM-04 address inside the car to 0.

Note: If it is parallel connection or group control, the address sequence is based on the order of the entire elevator group. For example: three elevators A, B, C for group control, elevator A serves floor -2, -1,1,2 ~ 8; B serves -1,1,3 ~ 8; C serves 1,2,4 ~7. In such case, set the SM-04 board of each elevator to the address as shown below.

Table 7.4: Setting of SM-04 Board Address

Floor	Elevator A Board SM-04 Set Address	Elevator B Board SM-04 Set Address	Elevator C Board SM-04 Set Address
-2	1	×	×
-1	2	2	×
1	3	3	3
2	4	×	4
3	5	5	×
4	6	6	6
5	7	7	7
6	8	8	8
7	9	9	9
8	10	10	×

The "×" in the table above indicates that there is no SM-04 board on the floor. In specific settings, firstly set the address switch on the SM-04 board (SW5.1 or SW1.4) to ON position, or set the address to the jumper pin (S1) or short with a short circuit cap (whether it is switch or jumper pin and what the switch code should be is determined by different types of SM-04 board. Refer to

Section 6.3 Definition of Display Penal Port). Then, power on the SM-04 board, and set it to the address setting state; the normal display of the elevator location now shows the address of SM-04 board. Press the up and down buttons to adjust the address data upward and downward until the address displayed shows that the SM-04 board is set on this floor. Finally, reset the address setting switch or the jumper pin to make SM-04 board back to normal operation.

9.5.4 Door Open/Close Adjustment

1) Set the elevator to inspection status, and leave the lift car at the leveling position;
2) Switch on power supply for gantry crane;
3) Move the car door manually, observe the portable manipulator to confirm if the door closing in place signal (HX0) and the door opening in place signal (HX1) work correctly;
4) Confirm that the safety edge signal and the overload signal are not in action;
5) Make sure that F165 parameter is 0 (door operation permitted during inspection for elevator)
6) Keep the car door in complete open state;
7) Push the door close button to confirm that the elevator is available for normal closing until door closing in place signal is activated;
8) After that, push the door open button to confirm that the elevator is available for normal opening until door opening in place signal is activated.

9.6 Shaft Self Learning

Shaft self learning means the elevator runs at self learning speed, and records the position of each floor and switch in the shaft. As the floor location is the basis for normal brake and operation of the elevator as well as floor display, it is mandatory to run shaft self learning first before express car running.

9.6.1 Shaft Self Learning Methods

1) Confirm that the elevator complies safe operation conditions.
2) Confirm that all switches and wires within the shaft are correctly installed, and the connection of accompanying cables and outside cables are correct;
3) Switch the elevator to inspection (or emergency power operation) status;
4) Enter the self learning menu via portable manipulator, follow the menu instructions, and find shaft self study interface. Then, move the cursor to shaft self study command, and push the Enter key;
5) Set the elevator into the automatic state to make it run down to the bottom landing at the self learning speed (set by F183), and then go up at self study speed automatically prior to shaft self learning. Shaft self learning is to be completed until the elevator arrives at the top leveling position and stops automatically. The portable manipulator shows "self learning completed" following a successful self learning;
6) During the self leering process, if the control system is abnormal, self learning will stop and give the corresponding fault code, and the portable manipulator will show "self learning failed".

9.6.2 Major Causes for Failed Shaft Self Learning

1) The total storey number set (F11) is inconsistent with the number of leveling spiles installed in the shaft;

2) The number of slow down switches installed is inconsistent with the data set by parameter F182;

3) The upper and lower leveling switch wiring is reversed;

4) The installation position of the leveling switch and leveling spiles is not accurate enough, and make it impossible for leveling switch to act effectively and correctly when the leveling spile of each floor are inserted;

5) The input point setting to leveling switch of normal open/close is inconsistent with the actual situation;

6) The terminal deceleration switch acts wrongly or is installed at a wrong position (when the lift car is at the ground floor leveling position, the down single landing terminal deceleration switch must acts; before the lift car goes upward to the leveling position of the next floor bottom, the down single landing terminal deceleration switch must have been reset; when the lift car is at the top floor leveling position, the up single landing terminal deceleration switch must act; before the lift car goes downward to the leveling position of the next floor top, the up single landing terminal deceleration switch must have been reset).

7) The input point setting to the terminal deceleration switch of normal open /close is inconsistent with the actual situation;

8) Encoder signal is interfered, or encoder has wiring error;

9) Leveling switch signal is interfered;

10) Leveling switch or encoder is in failure.

Special note: Be sure to run the elevator at inspection status to the lower limit in case of self learning of 2 landings/stops; ensure normal self learning operation only on condition that up leveling switch is released.

Note: Express car operation is only possible after shaft self learning.

9.7 Express Car Operation

1. Test Run of Express Car

After slow car runs correctly, firstly make sure that the elevator complies with safe operating conditions. Proceed with express car test run following shaft self learning. Specific steps are as follows:

1) Set the elevator in normal state.

2) Monitor the selected floor in the menu by portable programmer to select the floor where the elevator runs. Test run is possible for single floor, double floor, multi floors and full trip.

3) Check if the elevator is available for normal door closing, start, acceleration, running, cut, deceleration, parking, cancellation and opening.

4) In case of abnormal operation, follow the fault code (see Chapter IX) and operate accordingly

2. Safety Test

1) Safety Loop

Testing requirements: When the elevator stops, any safety switch is to be activated. After safety loop is disconnected, the elevator cannot start; when the elevator is under inspection operation, any safety switch is to be activated. After safety loop is disconnected, the elevator takes an emergency stop.

2) Door Lock Loop

Testing requirements: When the elevator stops, the elevator cannot start after any of the hall door locks is disconnected; when the elevator is under inspection operation, the elevator takes an emergency stop after any of the hall door locks is disconnected.

3) Safety loop relay adhesion protection (This function is not to be tested if no safety loop relay is provided)

Testing requirements: Press the emergency stop of control cabinet to disconnect the safety loop, and then force the safety loop relay not to release by any means. The system should be protected and not reset automatically;

4) Door lock loop relay adhesion protection (This function is not to be tested if no safety loop relay is provided)

Testing requirements: In the event that any forcible approach cannot release the door lock loop relay when the door is opened, the system shall provide protection other than auto resetting;

5) Brake contactor adhesion protection

Testing requirements: In the event that any forcible approach cannot release the brake contactor in case of stop, the system shall provide protection other than auto resetting;

6) Output contactor normal adhesion protection

Testing requirements: In the event that any forcible approach is taken to prevent release of output contactor in case of stop, the system shall provide protection other than automatic resetting;

7) Skid protection function

Testing requirements: Shift the elevator inspection to the middle floor; remove the leveling sensor lines from the control cabinet wiring terminal (assuming leveling floor signal is normally opened); switch it to normal mode; the elevator goes leveling at low speed; whereas the system will provide protection within 45s, which is unavailable for auto resetting;

8) Split-level protection

Testing requirements:

a) Move the elevator to the leveling position of middle floor, and switch it over to inspection or emergency power operation. If the terminal slow-down switch is a normal closed contact, disconnect the HA.1 wiring at the upper single deceleration switch input on the mainboard; if it is a normally open contact, just proceed with short connection of HA.1 and HA.9 (input COM terminal, DV0V). An intentional split-level fault is to be created in this way, and then the system will display the top floor data. After that, recover the HA.1 wiring at the upper single deceleration switch input, and switch the elevator to normal state; register the bottom instructions to make elevator express car go down; make sure that the elevator can decelerate and level normally to the bottom floor, and will not sink to the bottom;

b) Move the elevator to the middle floor, and switch it over to inspection or emergency power operation. If the slow-down switch is a normal closed contact, disconnect the HA.2wiring at the lower single deceleration switch input on the mainboard; if it is a normally open contact, just proceed with short connection of HA.2 and HA.9 (input COM terminal, DC0V). An intentional

split-level fault is to be created in this way, and then the system will display the bottom floor data. After that, recover the HA.2wiring at the lower single deceleration switch input, and switch the elevator to normal state; register the top instructions to make elevator express car go up; make sure that the elevator can decelerate and level normally to the top floor, and will not rush to the top.

9) Overload function

Testing requirements: Elevator overload switch is activated; check to make sure that the elevator is not closed; the buzzer sounds inside the car; whereas the overload indicator light is on.

3. Elevator function test

1) Auto run

Testing requirement: Register numerous instructions in the car, and confirm that the elevator can normally and automatically close the door, start, run at high speed, and automatically decelerate at the nearest registered landing, stop and cancel registration (the instruction canceled is in consistent with the landing the elevator stop) and open the door.

Register numerous upper or down hall call signals, and confirm that the elevator can automatically close the door, start, accelerate, run, cut, decelerate, stop, cancel and open the door.

2) Attendant running

Testing requirement: Turn the in-car switch to attendant status, and register numerous instructions. Keep pressing door-closing button to close the elevator door (if user release the door open/close button before door closing, the elevator will immediately turn from door-closing motion into door-opening motion until the door completely open). Proceed with auto startup for high-speed running after the door is closed; proceed with auto deceleration, stop, correct cancellation and automatic opening at the nearest floor registered with instructions. Register numerous upper and down hall call signals; keep pressing door-closing button until elevator closes the door (if use release the door open/close button before door closing, the elevator will immediately turns from door-closing motion into door-opening motion until the door is completely opened); once the door is closed, proceed with auto startup and high-speed running to ensure normal auto cut, deceleration, correct cancellation and auto door opening.

3) Independent running

Testing requirement: Turning the in-car switch to individual status, and make sure that no floor is shown on hall display board (or display floor No. with words like " out of service") , the call button does not work. Proceed with registration of instruction in car, and keep pressing door closing button until elevator door is closed, (if user releases the door button before the door is closed, the elevator will immediately turn from door-closing motion into door-opening motion until door complete open). It is to be automatically started after the door is closed; proceed with running at high speed and auto deceleration at the nearest floor with instruction registered for deceleration, stop, correct cancelation and auto opening.

4) Return at Fire

Testing requirement: when elevator parks at the certain floor other than firefighting return base station (appointed by F18) , turn the switch of base station return at fire into "On", all registered instructions and call signals will be completely canceled without any more registration allowed. The elevator will close door immediately, and return to firefighting base station in express car mode; whereas the elevator opens door and is out of service after auto door opening. When elevator runs in the opposite direction of firefighting base station in express car mode, just turn the base station

firefighting return switch into “On”. All registered instructions and call signals will be completely canceled without any more registration allowed. The elevator will park at nearest station without door open, and return to base station in express car mode and the elevator open door and be out of service after auto door opening. When elevator runs in the direction of firefighting base station in express car mode, just turn the base station firefighting return switch into “On”. All registered instructions and call signals will be completely canceled without any more registration allowed. The elevator will bypass to the base station with stop, and elevator open door and be out of service after auto door opening until firefighting return switch resets, and elevator returns to normal running status.

5) Firemen Operation (Only Limited to Firefighting Ladder)

Testing requirement: Turning the elevator firemen operation switch into “on”, elevator will immediately enter into emergency return for firefighting base station (appointed by F18) status. The whole process and motion are identical to that of the above fire return. After elevator returns to the firefighting base station, stop and open the door, and the elevator will enter into firemen operation status. At this point, there is no auto door opening or closing. When executing door closing operation in door complete opening status, just keep pressing door-closing button or instruction button, and elevator will turn form door closing motion to door opening motion until the door is completely opened. In case of door closing by keeping pressing instruction button, corresponding instruction signals will be registered after the door is closed. Press the instruction button for other floors in door closing status, the instruction signal will also be registered. After instruction signal is registered, the elevator will immediately start working automatically, running at high speed, and slowing down at the registered floor for stop. Car stop will enable all registered instruction signals to be removed. When car stops with door closed, just keep pressing door-opening button to maintain door opening until the door opens in place. Once the door-opening button is released in the process of door opening, the elevator will immediately change from door opening motion into door closing motion until the door is completely closed. The call button will always be out of function in the fireman operation mode. Only when the elevator parks at the firefighting base station, elevator door will open in position; whereas the firefighter switch will reset; whereas the elevator will return to normal running status.

6) Group control in Parallel (Only Limited to Parallel or Group Control Elevators)

Testing requirement: Register several hall call signals and confirm that the control system will allocate most recent or convenient elevators to respond registered call signals. When one elevator responded a call, the same call signals of all elevators in the same floor will be canceled at the same time. It is not allowed to have two or more than two elevator to respond the same call signal so as to ensure the down call signals of top floor registered effectively, and enable the nearest or most convenient elevator to respond. When each elevator in the group has inconsistent service floor, do the following test for the floors that only some of elevators can park: move the elevator from its original floor to the floor a little bit far, and move the elevators that cannot park at the floor to park at the near floor. When register call signal for the floor, ensure a nearest elevator in those for that floor to respond immediately. If base station return function and standby elevator disperse function are available, make sure that the parking floor location is conform to the result of required return base station and elevator standby dispersion.

7) Elevator Locking Function

Testing requirement: Supposing that elevator stops at the floor outside of elevator lock base station or is running, just turn the elevator lock key at base station to the position of elevator lock. The elevator can erase all registered call signals, and will not register any new call signal. Whereas, landing will display that the floor extinguishes or show the words “out of service”. The elevator will continue to respond instruction (before arriving at the base station, it will continue to accept new instruction registration signal). After finishing response to instruction signal, it will automatically return to base station; stop car, open the door, cut off in-car lighting, and turn off the fan after the door completes its opening, Wait for 10seconds before closing the door. The elevator will then be out of service.

Supposing that elevator stops at the elevator lock base station, just turn the elevator lock key at base station to the position of elevator lock, the elevator can automatically open the door ,cut off in-car lighting, and turn off the fan after the door completes its opening, Wait for 10seconds before closing the door. The elevator will then be out of service.

9.8 Elevator Comfort Adjustment

9.8.1 Factors Relating to Elevator Comfort In Operation

1. Electrical Factors

1) Operating curve parameters setting: acceleration, deceleration, S curve bend time, start brake delay, stop brake delay, etc.;

2) Vector control PID parameters: proportional gain, integral and differential constants, etc.

2. Mechanical Factors

Rail verticality, surface roughness, connection, guide shoe tightness, uniformity and tension of steel wire rope, etc.

The coordination in the mechanical system is the most fundamental factor to determine the comfort of the elevator operation; electrical parameters can only cooperate with the mechanical system, and further improve the comfort. The electrical factor is adjusted by the serial mainboard parameter and inverter parameter.

If there are problems in mechanical systems affecting the comfort, the serial mainboard parameter and inverter parameter can only improve comfort, but cannot change the mechanical defects fundamentally. The commissioning and related technicians are requested to pay sufficient attention to this issue.

9.8.2 Elevator Comfort Adjustment

9.8.2.1 Adjustment of Mechanical Factors

1. Slide way

- Surface roughness of guide rail
- Slide way installation verticality
- Treatment of slide way connectors

The sideway verticality and the parallelism between two sideways should be controlled within the limits prescribed by the national standard (GB). If the error is extremely big, it will affect the elevator comfort in high-speed operation; whereas the elevator will jitter and vibrate, or the lift car shakes from left to right in some positions.

Improper connections of slide way will generate a sense of stepping to the elevator operation in some specific positions.

2. Tension of Guide Shoe

Extremely tight guide shoe may produce a sense of stepping and braking at stop; whereas lift car may produce a sense of swing if the guide shoe is extremely loose.

If the guide shoe is of the sliding type, then a small space is to be maintained between the guide shoe and the slide way. If there is no space, or guide shoe rubs the slide way surface, it will produce an oscillation or a sense of step when the elevator starts and stops.

In case of commissioning, shake the lift car with feet from left to right on the car top. It will be enough if the lift car has a obvious small displacement from left to right.

3. Tension Uniformity of Steel Wire Rope

If the steel wire rope tension is uneven, some ropes will be tight but some loose to cause jitter or oscillation in the elevator operation, and thus affect the startup, high-speed operation and stop.

During commissioning, it is applicable to stop the elevator on the middle floor. Pull every steel wire rope manually with the same force on the car top. If the pull distance is roughly the same, the steel wire ropes are to be under the uniform tension; if not, it is a must to call the installer to adjust the tension of steel wire ropes.

In addition, steel wire ropes are tied in circle around before installation, which is provided with inner response torsion stress. If installed directly, the elevator operation will prone to vibrate. Therefore, it is necessary to fully release such torsion stress before installation.

4. Fastening and Sealing of Lift Car Installation

When the elevator is running at high speed, the entire lift car will be under a great force. If the lift car bracket or the lift car wall is not well fastened during high speed operation, it will generate dislocation, and have the lift car vibrate. The buzzer acoustic resonance of the lift car is generally related to the fastening degree of the installation, the sealing of the lift car and the well.

5. Anti-Mechanical Resonance Device

- Pad rubber gasket under tractor shelf girder;
- Use wood chuck or other similar devices at the pigtail of the lift car steel wire rope to eliminate vibration.
- Presently, for decorative effects, some lift cars use new light-weight materials that can reduce the weight of the lift car to produce "mechanical resonance ", especially in high speed elevator. When such phenomenon occurs, add appropriate load on the lift car to change its natural frequency, and eliminate mechanical resonance.

6. Tractor

Sometimes, improper assembly of tractor may lead to poor engagement between turbine worm and gear; Alternatively, prolonged use may result in excessive wearing of turbine worm and gear and axial movement in case of acceleration or deceleration of the elevator; this may produce a sense of stepping during acceleration or deceleration.

7. Lift Car Balance

Sometimes, the design or installation or other reasons may make imbalance weight of the lift car to slide to one side. When the elevator is in operation, the guide shoe tightly rubs the slide way surface, which generates jitter or vibration. At this point, add a block on the lighter side of the lift car for test.

8. Others

Such as the parallelism of traction wheel and guide wheel, the adjustment of run-time brake clearance, etc.

9.8.2.2 Adjustment of Electrical Factors

Major electrical factors affecting comfort mainly include: the performance of the speed curve, electromagnetic interference of analog signal speed reference signal (if using analog signal speed reference method), encoder feedback signal quality and inverter drive performance. Our later discussion is established on that all other factors above-mentioned that may affect comfort have been adjusted. How can we adjust the parameters relating to AS380S integrated drive control cabinet to improve the drive performance of the system and the comfort of elevator?

1. Adjustment of Startup Comfort

AS380S integrated drive controller uses original non-load sensor start-compensation technology, so even if there is no pre-load device for start compensation, it can also be adjusted by parameters to achieve good starting comfort.

1) Approaches for Adjustment of Conventional Startup Comfort

Normally, it is applicable to adjust the inverter's zero servo PID parameters as well as excitation time and other parameters to improve the starting comfort effectively. Refer to the Table below for relevant adjustment parameters.

Table 7.6: Adjustment of Inverter Zero Servo PID and Excitation Time for Improvement of Elevator Startup Comfort

Function	Designation	Items	Factory Setting	Set Range	Unit	Remark
F212	Zero servo gain P0	Gain value of PID regulator that takes effect on zero servo	100.00	0.00~655.35	×	
F213	Zero servo integral I0	Integral value of PID regulator that takes effect on zero servo.	120.00			
F214	Zero servo differential D0	Differential value of PID regulator that takes effect on zero servo	0.50			
F226	Zero servo time	Startup accelerated movement after the inverter gives operating signal and this time maintains torque.	0.8	0.0~30.0	s	

Note: Adjustment of PID regulator for velocity loop at the starting point

F226 is a zero servo time parameter used to adjust and control the delay time given by the system speed curve; this time is also the action time of PID regulator P0, I0, and D0 at zero servo (or zero speed). See the following for the detailed timing sequence diagram.

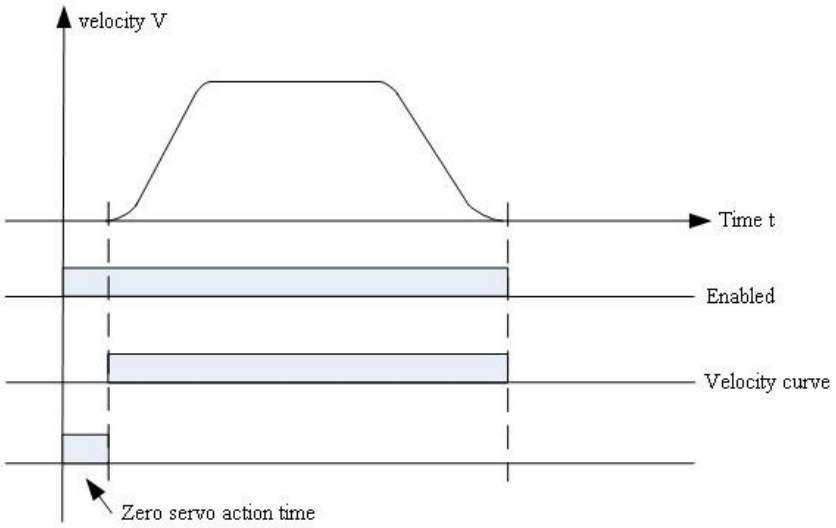


Figure 7.7: Zero Servo Timing Sequence

When zero servo ends, AIO inverter gives the controller a signal with speed instruction, and the elevator begins to accelerate.

F212, F213 and F214 are proportional gain (P0), integral constant (I0) and the differential constant (D0) of the zero servo regulator. In case of adjustment, firstly set P0 to a very small value, and let the elevator go downward non-loaded; at this point, the elevator would pull-back at startup. Increase the P0 value gradually until the elevator stops pulling-back at startup. However, if P0 is extremely high, the elevator may oscillate up and down at startup. Therefore, in case of obvious oscillation at startup, decrease the P0 value. I0 is the integral constant of zero-speed PID regulator at startup. The greater I0 leads to the shorter response time. If the I0 value is extremely low, P0 will not have enough time for motion; if I0 is extremely high, high frequency oscillation may be easily produced. D0 helps the system maintain the response speed. The higher D0 is, the faster response will be; however, extremely high D0 can cause oscillation.

2) Improvement of Elevator Startup Comfort through Adjustment of Timing Sequence

The starting timing sequence is the coordination between the main contactor pull, release of inverter upward or downward command (or enable signal), brake open and the preset speed signal when the elevator starts. In general, at the elevator starter, the main contactor pulls first, then inverter enables signal releases; after that, brake open and speed command is to be given out. The order between the preset speed and the brake open has a great impact on the starting comfort of the elevator. The ideal coordination point is stated as follows: At the mechanical movement (really open) of the brake, the preset speed is given at the same time. However, due to the brake contactor delay and the mechanical brake delay, it is not easy to give accurate data for the two motions to achieve the desired effect. The following principles may be observed for adjusting timing sequence: during no-load operation, if the downward start shows an obvious pull back, just postpone the opening time of the brake (or set the preset speed earlier); if the downward start shows a weak pull back, but an obvious push for the upward start, set the brake open ahead of time (or postpone the preset speed given time). Timing Sequence Diagram at start and stop is shown as follows.

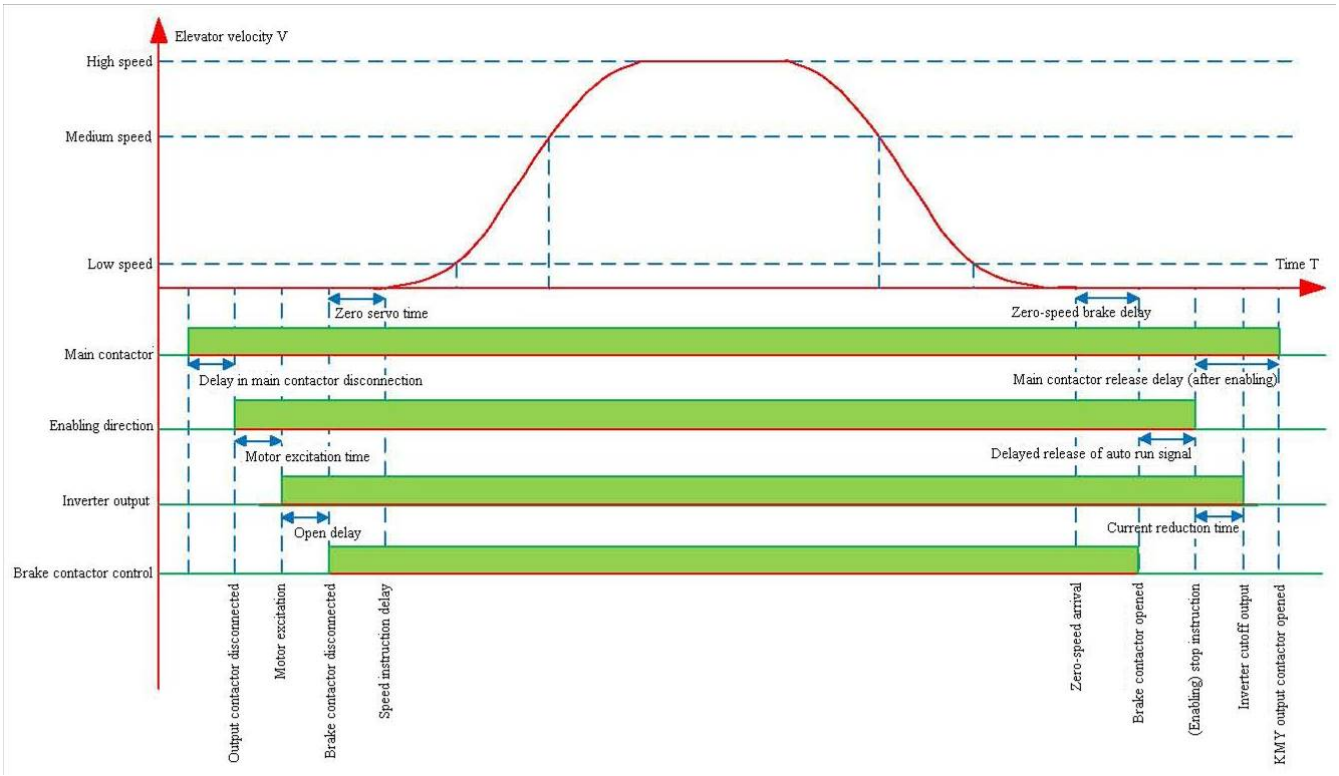


Figure 9.7: Adjustable Timing Sequence Diagram

2. Adjustment of Comfort during Operation

By adjusting the PID regulator parameters at each speed segment in the elevator running process, the comfort can be improved. The adjusting parameters are as follows.

Table 7.8: Adjustment of PID Regulator Parameters at Each Speed Stage for Improvement of Comfort of Elevator Operation

Function Code	Designation	Items	Factory Setting	Range	Unit	Remark
F215	Low-speed gain P1	The effective PID regulator gain value when the given speed is lower than the switching frequency F0	70.00			See the following description
F216	Low-speed integral I1	The effective PID regulator integral value when the given speed is lower than the switching frequency F0	30.00			See the following description
F217	Low-speed differential D1	The effective PID regulator differential value when the given speed is lower than the switching frequency F0	0.50			See the following description
F218	Medium-speed gain P2	The effective PID regulator gain value when the given speed is between switching frequencies F0 and F1	120.00			
F219	Medium-speed integral I2	The effective PID regulator integral value when the given speed is between switching	25.00			

Function Code	Designation	Items	Factory Setting	Range	Unit	Remark
		frequencies F0 and F1				
F220	Medium-speed differential D2	The effective PID regulator differential value when the given speed is between switching frequencies F0 and F1	0.20			
F221	High-speed gain P3	The effective PID regulator gain value when the given speed is higher than the switching frequency F1	140.00			
F222	High-speed integral I3	The effective PID regulator integral value when the given speed is higher than the switching frequency F1	5.00			
F223	High-speed differential D3	The effective PID regulator differential value when the given speed is higher than the switching frequency F1	0.10			
F224	Switching frequency at low speed point F0	Set the switching frequency parameter of PID regulator at low speed point, which is based on a percentage of nominal frequency. If the rated frequency is 50Hz, the required switching frequency F0 is 10Hz. As 10HZ accounts for 20% of 50Hz, the data is to be set to 20	1.0	0.~100.0	%	See the following description. In the medium-speed segment between F0 and F1, PID regulation data is automatically generated by the system based on the low and high-speed PID
F225	Switching frequency at high speed point F1	Set the switching frequency parameter of PID regulator at high speed point, which is based on a percentage of nominal frequency. If the rated frequency is 50Hz, the required switching frequency F1 is 40Hz. As 40HZ accounts for 80% of 50Hz, the data is to be set to 80	50.0	0.0~100.0	%	See the following description. In the medium-speed segment between F0 and F1, PID regulation data is automatically generated by the system based on the low and high-speed PID

Parameters F215 ~ F217 are P, I and D values (P1, I1, D1) of the PID regulator at the low-speed section, F218 ~ F220 are P, I and D values (P2, I2, D2)of the PID regulator at the medium-speed section, F221 ~ F223 are P, I and D values (P3, I3, D3) of the PID regulator at the high-speed section.

They play roles in different sections on the running curve during the entire elevator operation. Parameters F224 and F225 are switching frequency between intervals. Adjust Parameters F215 ~ F217, F218 ~ F220 and F221 ~ F223 and F224 and F225 to improve respectively the comfort of the elevator when running through different sections.

Increase of the proportional constant P can enhance the system's dynamic response. But if P is extremely big, it may generate overshoot and oscillation of the system. The impact of P on the feedback tracking is as shown below.

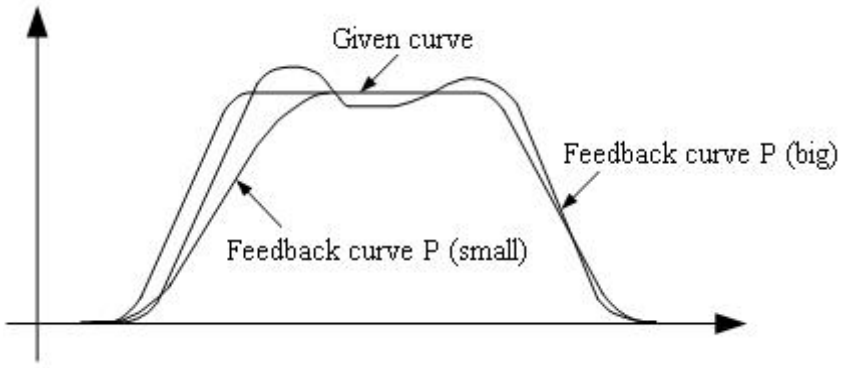


Figure 9.9: Impact of Proportional Constant P on Feedback Tracking

Increase of the integral constant I can accelerate the system's dynamic response. Increase I if the overshoot is too big or the dynamic response is too slow. But if I is too big, it may generate overshoot and oscillation of the system. The impact of P on the feedback tracking is as shown below.

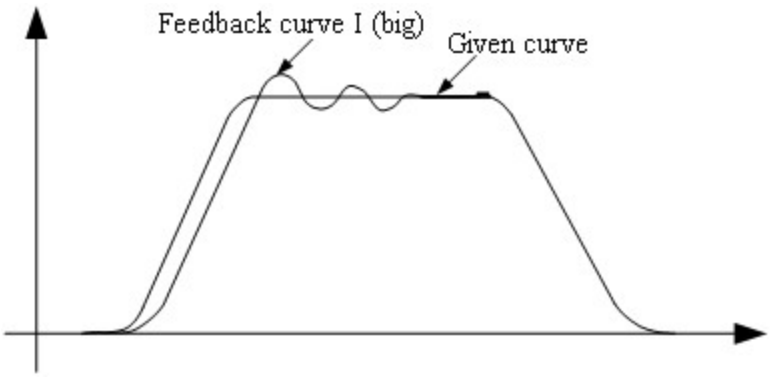


Figure 7.10: Impact of Integral Constant I on Feedback Velocity

Similarly, increasing the differential constant D can increase the sensitivity of the system. However, if D is too big, the system will be too sensitive to the extent of causing oscillation.

In case of adjustment of PID regulator parameters, it is usually necessary to adjust the proportional constant P firstly. If the system is not oscillated, just increase the P value as far as possible, and adjust the integral constant I so that the system has both fast response and little overshoot. Adjust value D only on condition that the adjustment results of P and I are not satisfactory.

The segment of the PID regulator in Elevator operation curve is shown as follows:

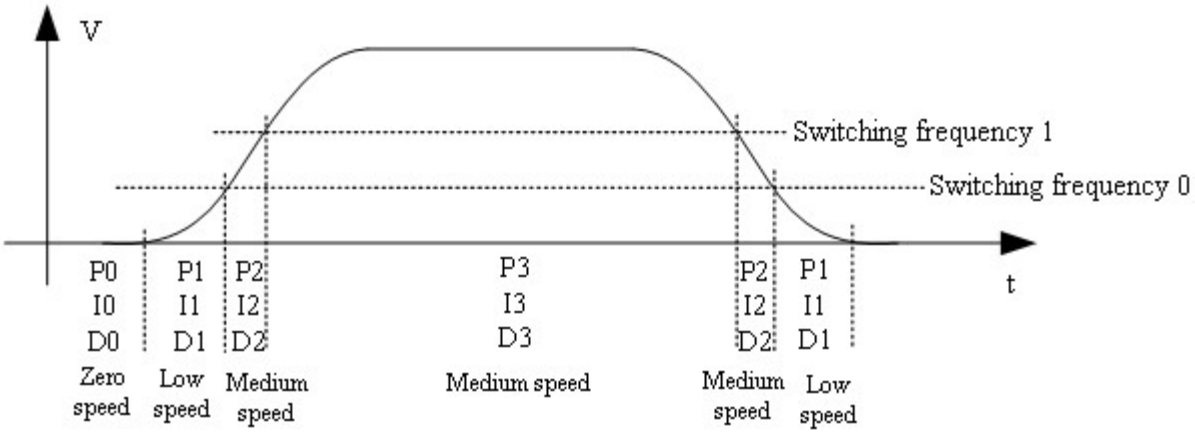


Figure 9.11: Diagram for Control of Elevator Operation Curve Segment PI

Viewing from aforesaid figure, it can be seen that the PID regulator of this inverter is adjusted in three different speed sections, which aims to facilitate the commissioning work. In case of poor comfort effect in high-speed section, it is applicable to adjust PID parameters in high speed section that has little impact on the other two sections. Similarly, in case of poor comfort effect in medium and low-speed sections, it is only applicable to adjust the corresponding PID parameters. As different sections require different PID parameters to achieve the best comfort, adjusting PID values by sections can provide each speed section with the best effect.

3. Adjustment of Elevator Operation Curve

The shape of elevator operation curve will also directly affect the comfort of elevator. In order to satisfy passengers' requirements for comfort and operational efficiency, the elevator should run according to the S-curve. The system can adjust the acceleration / deceleration slopes of the S curve and time constant at four corners to ensure the comfort and operational efficiency of the elevator. The main parameters that may affect the curve are stated as follows.

Table 9.12: Adjustment of Acceleration/Deceleration Slope of S Curve and Time Constant at Four Corners for Improvement of Comfort during Elevator Operation

Parameters	Designations	Recommended Values and Reference Range	Parameter Range
F0	Acceleration slope a1	0.500 (0.400~0.650)	The smaller this value is, the more stable the acceleration will be. However, extremely small value may affect efficiency. The greater this value is, the quicker the acceleration will be: ① User may feel uncomfortable in case of extremely quick acceleration ② Extremely quick acceleration may incur current fault. normally, the appropriate value is 0.400, 0.500 and 0.600 for 1m/s, 1.5~1.8m/s and 2.0m/s respectively. Especially, it should be appropriate for elevators in hotels and residential buildings with many old people and children.
F1	Deceleration slope a2	0.500 (0.400~0.650)	The smaller this value is, the more stable the deceleration will be. However, extremely small value may affect efficiency. The greater this value is, the quicker the deceleration will be: ① User may feel uncomfortable in case of extremely quick acceleration ② Extremely quick acceleration may incur current fault. normally, the

Parameters	Designations	Recommended Values and Reference Range	Parameter Range
			appropriate value is 0.400, 0.500 and 0.600 for 1m/s, 1.5~1.8m/s and 2.0m/s respectively. Especially, it should be appropriate for elevators in hotels and residential buildings with many old people and children.
F2	S curve T0	1.300 (1.300~1.600)	T0: With regard to transition time curve from startup to initial acceleration, the greater the value is, the more stable the startup will be. At this point, elevator runs at a low speed; extremely long curve would make it impossible for motor to drive the elevator to the extent of incurring PGO or current fault, especially when the lift car is overloaded.
F3	S curve T1	1.100 (1.00~1.200)	T1 refers to the transition time curve between the end of acceleration and the highest speed; T2 refers to the transition time curve between the highest speed and initial deceleration T1 and T2 have no significant impact on comfort, which normally requires no adjustment. Extremely high value of T2 may lead to level rush.
F4	S curve T2	1.100 (1.000~1.200)	
F5	S curve T3	1.300 (1.300~1.600)	T3 refers to the transition time curve between the end of deceleration and stop; the greater the value is, the more stable the stop will be. At this point, elevator runs at a very low speed; extremely long curve would make it impossible for motor to drive the elevator to the extent of incurring PGO or current fault, especially when the lift car is overloaded.

Note: Appropriate turndown of F0 and F1 is helpful for increase of elevator comfort; however, it may also affect the operation efficiency. Furthermore, appropriate extension of time of F2-F5 corners is also favorable for improvement of comfort; nevertheless, it may also affect the operation efficiency.

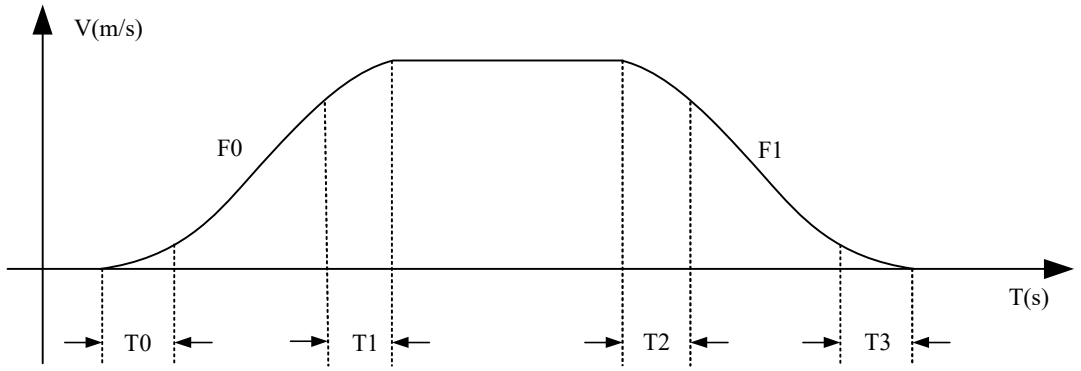


Figure 7.13: Elevator Operation Curve

4. Adjustment of Comfort at Stop

The following two points affect the elevator comfort most at stop: 1. the PID value in low-speed section. Just as described in previous section, adjusting the PID value in low-speed section may help the elevator gain the best comfort at stop. 2. Time sequence for stop. It is mainly coordination between the preset speed at stop and the brake action. The ideal state is stated as follows: when the reference speed is zero, elevator exactly holds the brake. The adjustment principle is stated follows: if the elevator jerks at stop, it means the brake is held too early; on the other hand, if the elevator skids at stop, it means the brake is held too late.

9.9 Leveling adjustment

Proceed with leveling precision adjustment once the comfort adjustment upon completion of comfort adjustment.

9.9.1 Basic Conditions for Elevator Leveling

1. Accurate installation of door area sensor and deck board serves as the prerequisite for accurate leveling, which means:
   - The deck length at door area of each floor must be accurate and consistent;
   - Bracket is to be solid;
   - The deck boards is to be accurately installed. When the lift car is at leveling position, the deck center is to coincide with the center between sensors of two door areas. Otherwise, there will be leveling deviation to this floor, which means it is higher or lower than the upper and lower leveling points.
2. If a magnetic sensor switch is used, the deck board is to be inserted deeply enough when installed. Otherwise, it will affect the action time of the sensor switch, and lead to higher on top and lower on bottom when leveling on this floor.
3. To ensure leveling, the system also requires elevator to creep for a short distance before stop.
4. In the actual adjustment, just level one of the middle floors firstly until it is leveled up. After that, proceed with adjustment of other floors by taking its as the parameter.

Make sure that the stop position (that means that the stop position should have an error of ≤ ± 2 ~ 3mm) is repeatable for the elevator to go both upward and downward to stop at a middle floor through adjustment of curve selection and gain in proportion and integral as described in previous section.

9.9.2 Adjustment of Leveling Precision

1. Confirmation of Repeatability of Stop Position

Make sure that the stop position (that means that the stop position should have an error of ≤ ± 2 ~ 3mm) is repeatable for the elevator to go both upward and downward to stop at a middle floor through adjustment of curve selection and gain in proportion and integral as described in previous section.

2. Adjustment of Deck Board at Door Area

1) Make the elevator stop floor by floor; measure and record the deviation △S between the lift car sill and the hall door sill (positive when the lift car sill is higher than the hall door sill, otherwise negative.)

2) Adjust the position of deck board at door area floor by floor, if △S> 0, then move the deck board downward by △S; if △S <0, then move the deck board upward by △S.

3) Proceed with self learning of shaft after adjustment of deck board in door area.

4) Check the leveling again. If the leveling accuracy does not meet the requirements, repeat steps1) ~3).

3. Adjustment of Parameter Menu

If the stop positions of the elevator are repeatable, but not at the same position on each floor, for upward or downward leveling, such as up higher down lower, or up lower down higher, this fault can be settled by adjusting the leveling parameters of F56 and F57 in the parameter menu. Its default value is **50mm**. Decrease the F56 value when the elevator goes upward and rushes over the level; adjusting value is equivalent to **50% of the leveling difference value**. For instance, if the total differential value is **20mm**, the adjusting value is to be reduced by **10mm**.

9.9.3 Installation Standard for Leveling Switch

When the lift car sill and the hall door sill are on the absolute level, the upper surface of the leveling spile is about 10mm higher than the lower leveling switch; whereas the lower surface of the leveling spile is about 10mm lower than the upper leveling switch; this aims to facilitate adjustment of comfort and leveling accuracy. The standard length of leveling spile is 220mm, which is expected to ensure that every spile is of the same length (the length error should be less than 3mm). (See the following figure).

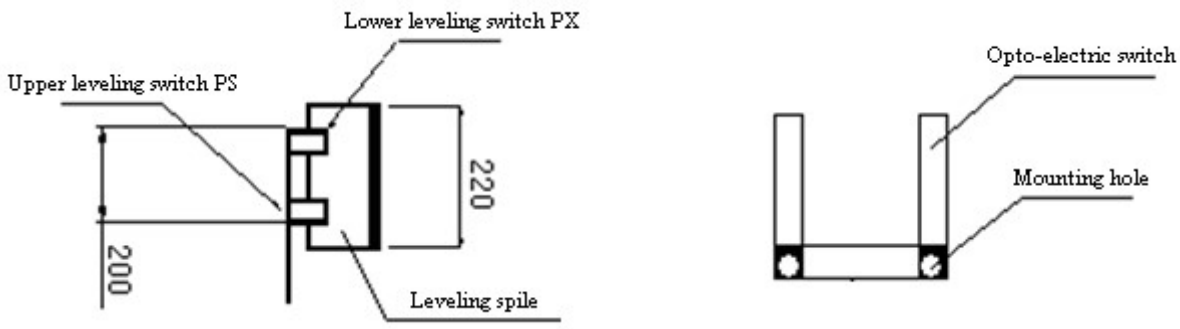


Figure 7.14: Installation Standard for Leveling Switch

Select magnetic switch as leveling switch

1. Insert the leveling switch into the leveling spile deep enough to ensure that the action of leveling switch is effective and reliable
2. The verticality of the leveling spile is so demanding, which aims to ensure that it will not happen for leveling stop that only one leveling switch acts effectively; however, the other will run out of effective motion range, which will affect the normal operation of elevator.
3. Select optical switch as leveling switch (**our company generally accepts low-level effective signal for the input interface of the serial system**). Proceed with treatment according to the following points to ensure a better effect.

1) Scrape the paint in the shadow around the installation hole to make sure that the metal shell is well grounded by photoelectric switch bolts, brackets and car top; if pressing an grounding wire under the mounting bolt after scrape, and connecting it to the grounding pile of the connection box on the car top, the effect will be better;

2) Photoelectric switch should be connected to the connection box on the car top; whereas the shield layer is to be grounded.

3) To significantly reduce interferences, it is better to select conventional photoelectric switch.

4) The photoelectric switch flashing in operation may result in abnormal operation of elevator or leveling, which may subject to interference; therefore, be sure to connect a capacitor of 0.1μF63V between COM and PS (or PX) of the photoelectric switch. See the following figure.

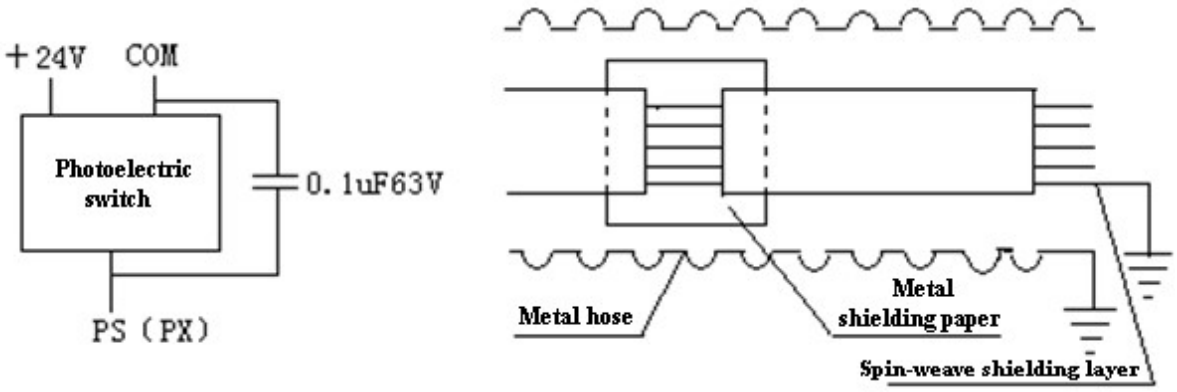


Figure 7.15: Capacitor Wiring Diagram

Note: Improper disposal of leveling photoelectric switch may interfere with normal operation; whereas frequent change is not a fundamental solution, and may greatly increase the cost. On the contrary, aforesaid 4 methods can greatly reduce the interference, and may even eliminate interference.

9.9.3 Precautions for Installation of Leveling Switch

1. The opto-electric or magnetic switch should be inserted to 2 / 3 of the leveling spile; check to make sure that the leveling spile on each floor is vertical, and the insertion depth is the same.
2. Once opto-electric or magnetic switch is inserted into the leveling spile, make sure that both ends expose by 10mm-30mm as shown in the following figure.
3. During installation, make sure that the center of spile on each floor is in alignment with that of the sensor so as to ensure the leveling effect.
4. When the elevator goes upward and downward respectively and arrives at every floor normally, record the height difference between the lift car sill and the hall door sill. When the elevator runs up: Higher lift car sill means leveling excess; otherwise, it means leveling lack; when the elevator runs down: lower lift car sill means leveling excess; otherwise, it means leveling lack. After recording, move the unleveling well spile, and record again.

In case of excessive height difference to leveling on each floor, it is applicable to maintain the same leveling difference to most of floor through adjustment of leveling spile. Further debug parameters to control leveling deviation within the standard range on this basis.

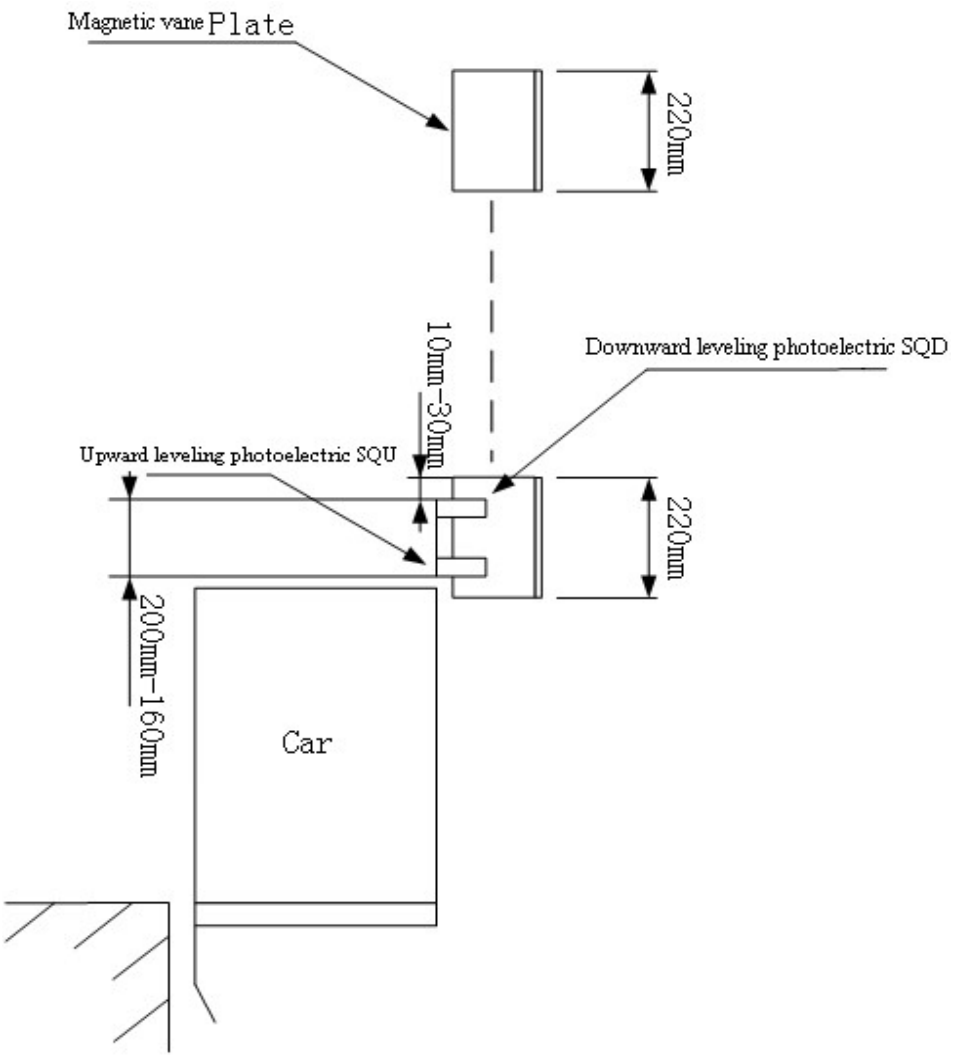


Figure 7.16 Leveling Switch Installation Diagram

5. When the rotary Encoder is interfered or in poor quality, it will also affect the leveling accuracy Check if the encoder is provided with shielding line, and the shielding layer is to be grounded at one end of the control cabinet. Also note that when wiring, the encoder line is positioned in the same trough as the power line.

9.9.4 Precautions for Adjustment of Leveling in Serial Control System

1. Recommended Value for Center Space of Leveling Sensor

In case of door closure and under leveling function: The center space of the leveling sensor is suggested to be 60mm shorter than the length of spile that is exposed by 30mm on both sides. In case of door opening and under leveling function: The center space of the leveling sensor is suggested to be 40mm shorter than the length of spile that is exposed by 20mm on both sides.

2. Set F21 (leveling sensor delay adjustment) to 6mm and 10mm respectively for the value below 1.75m/s and 2.0~3.0m/s.

3. Set F56 = 50, F57 = 50. Set the leveling fine-tuning of each floor to 20

4. Adjust the PI value of the elevator AS380S integrated drive control cabinet, and eliminate

its overshoot.

5. If upward and downward running is almost the same for deviation to each floor, just uniformly adjust parameter through leveling; when leveling of individual floors is incorrect, just proceed with adjustment via the leveling fine tuning parameter. Specific procedures are stated as follows:

1) Elevator express car running upward stops at n floors at random; measure floor difference between the lift car and sill at stop (prior to initiation of leveling); Record as a positive number when the lift car is higher than the sill and record as a negative number when lower. Once completed, add the data, and take the average value of XUp; if XUP is positive, **uniform adjustment parameter** for upward leveling is to be decreased by Xup; otherwise, it is to be increased by absolute value of Xup. Similarly, uniform adjustment procedures for downward leveling is just the same as mentioned above.

2) Following uniform adjustment of leveling, elevator express car would stop at each floor; measure floor difference between the lift car and sill at stop (prior to initiation of leveling); proceed with fine adjustment of downward running deviation value for upward running when the lift car is higher than the sill; if the lift car is lower than the sill, just proceed with fine adjustment of deviation value for upward running.

Fine adjustment for downward leveling is the same as mentioned above; elevator express car running downward would stop at each floor; measure floor difference between the lift car and sill at stop (prior to initiation of leveling); proceed with fine adjustment of downward running deviation value for downward running when the lift car is higher than the sill; if the lift car is lower than the sill, just proceed with fine adjustment of deviation value for downward running.

3) Express car running upward and downward would stop at all floors following leveling adjustment; check leveling state.

Note: Do not proceed with fine leveling adjustment in case of repeated leveling after the door is opened; it is only applicable to proceed with adjustment by striking the spile.

9.9.5 Reasons for Improper Leveling Adjustment

Please check the following problems discovered through summary in proper sequence:

1. The following parameters will lead to improper leveling adjustment if not reasonably configured

1) Check **F21 (leveling sensor delay adjustment);** factory value is 6mm.

- For the value below 1.75m / s, it can be set to 6mm when the elevator uses optical leveling sensor;
- It can be set to 10 mm when the high-speed elevator (3.0m / s or above) uses optical leveling sensor
- It can be set to 16 mm when the high-speed elevator (5.0m / s or above) uses optical leveling sensor

2) **For F56 upward leveling adjustment**, the factory value is 50mm.

3) **For 57 downward leveling adjustment**, the factory value is 50mm.

4) **Fine leveling adjustment**: Set the fine leveling adjustment of each floor to factory default value of 20 mm

2. Encoder Interference

1) Encoder shielded wire is not grounded, or the signal lines and power lines are not separated, or interfered by power lines.

This problem is very serious on the synchronous motor site. Sincos Encoder or resolver is small analog signal, more vulnerable to interference, which is reflected by random irregular unleveling.

2) Inspection Method

Record the shaft data (from the bottom to the top) after self learning; re-start shaft self learning; compare the two self leering data to make sure that corresponding position error is less than 3mm (usually identical or difference of + - 1mm); if the error is more than 3 mm, it can be deemed as encoder interfere or traction wheel skid.

3) Solutions

a) Confirm that the motor ground wire has been connected from the motor to the control cabinet

b) Confirm that the shielding line from Encoder to the inverter PG card has been grounded at the inverter end. Check whether this grounding line has intermediate connection terminal. If any, make sure both ends of the shielding lines are grounded. **Note: the connection of the synchronous motor Sincos Encoder!!!**

c) Confirm that the shielding line from the inverter PG Card to the mainboard encoder has been grounded;

d) Confirm the encoder lines are kept away from power lines and braking resistor lines (cover the encoder lines with flexible conduit if in the same groove)

e) Confirm that the 0V of PG card is connected with the 0V of the mainboard (in particular, in multi-speed A +, A-, B +, B-output)

f) Check if connecting shaft of encoder skid.

3. Steel wire rope of traction wheel slips

1) Phenomenon

The leveling is not accurate in case of operation with no-load or full load, or the upward leveling is inconsistent with downward leveling; whereas half-load operation leveling is accurate.

2) Inspection Method

At any floor (assumed to be Floor 3), mark an aligning chalk line between the steel wire rope and the traction wheel, run a single level back and forth layer (Floor 3 ->Floor 4, Floor 4 to Floor 3), and return to Floor 3; check the error distance with the chalk mark (required to be less than 5mm). This error distance is the slip error for a single level. The slip error should be done twice respectively in no load and full load. All slip errors greater than 5 mm are to be resolved.

3) Solutions

a) There may be a 200Kg weight difference for the lift car before and after decoration. Has the lift car decoration finished? Is the current balance coefficient correct? If not sure, set the lift car to half loaded. Is there still leveling error?

b) If it is impossible to resolve the slipping problem for high-speed elevator, it is applicable to try the following two solutions:

① Install encoder on one side of the speed governor to feedback the position to the mainboard.

② Absorb slip error through creeping; set F24=2 (analog signal with creeping) or F24=0 (multi-speed operation)

4. When using magnetic reed sensor, ensure adequate insertion depth. Check if the leveling

spile of each floor has been inserted into within the red line of the sensor and if any spile is installed slantly.

5. The leveling spiles have inconsistent lengths. The spile on the second floor is the benchmark length; whereas the spiles on the other floors should be of the same length with that on the second floor; otherwise it may cause leveling problems.

6. Fail to proceed with shaft self learning following adjustment of spile.

9.10 Method for Adjusting Pre-Load Weighing Compensation at Elevator Start

As AS380S integrated drive control cabinet adopts the advanced non-load sensor start compensation technology, the elevator can still gain comfort at start even without pre-load weighing device. See its start features as shown in the following figure.

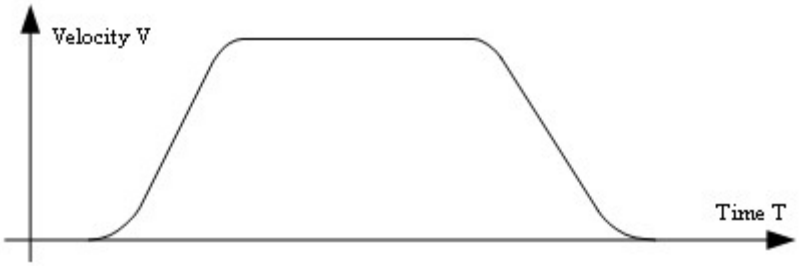


Figure 7.17 Compensation Characteristics for No-load Sensor Startup

Although AS380S series integrated drive control cabinet does not need pre-load weighing device under normal circumstance, on some occasions, analog signal weighing devices installed to obtain overload and full load signal; alternatively, some elevator users have particularly high comfort requirements when elevator starts and asks for pre-load weighing device for starting compensation; there is also another case: In case of using non-gear tractor, no Encoder complies with non-pre-load starting compensation requirements, and the elevator would need to install the pre-load devices additionally; whereas inverter adopts torque compensation technology at startup.

When pre-load weighing is used to compensate startup, it is necessary to set and adjust the following parameters.

Table 7.18: Parameters to Be Set and Adjusted for Startup Compensation through Pre-load Weighing

Parameters	Designations	Factory Setting	Range	Unit	Remark
F164	Weighing device type	99	0~99	×	For details, please refer to the following description
F70	Light-load upward gain	100	0-300	%	
F71	Light-load downward gain	100	0=300	%	
F72	Heavy-load upward gain	100	0-300	%	
F73	Heavy-load downward gain	100	0-300	%	
F74	Light-load height gain	512	0-1024		

Parameters	Designations	Factory Setting	Range	Unit	Remark
F75	Heavy-load height gain	512	0-1024		
F229	Torque compensation direction	0	0/1	×	Set torque compensation direction 0: forward;1: reverse
F230	Torque compensation gain	100.0	0.0~200.0	%	Set startup torque compensation gain
F231	Torque compensation bias	0.0	0.0~100.0	%	Set startup torque compensation bias

Wherein: F164 parameter has the following meanings:

Table 9.19: Meanings of Set Values of F164 Parameter

F164 Set Value	Model of Weighing Device	Acquisition of Light, Heavy and Full Load Signals	Acquisition of Compensation Signals
0	DTZZ-III-DC-SC	Input open/close signal to the car top board	Input weighing device signal by CAN, and then calculate the final compensation value by weighing device signal, F70~F75 parameters
1	DTZZ-II	Input weighing device signal by CAN, and then calculate the result by weighing device signal	Input weighing device signal by CAN
2	DTZZ-II	Input open/close signal to the car top board	Input weighing device signal by CAN
3	DTZZ-III-DC-SC	Input weighing device signal by CAN, and then calculate the result by weighing device signal	Input weighing device signal by CAN, and then calculate the final compensation value by weighing device signal, F70~F75 parameters
4	无	Input open/close signal to the car top board	Calculate the weighing compensation values at light load and heavy load by light/heavy switch signal, F70-F75 parameters. And F40 is set to be 50％at this moment.
5		Input open/close signal to the car top board	Input weighing device signal by analog signal
6		Input weighing device signal by analog signal, and then calculate the result by weighing device signal	Input weighing device signal by analog signal
99		Input open/close signal to the car top board	None

There are three different adjustment methods corresponding to the different types of weighing devices: The first method is to use DTZZ-III-DC-SC weighing device (set F164 as0 or 3); the second method is to use non-DTZZ-III-DC-SC weighing device (set F164as1, 2, 5 or 6); the third method is without weighing device, a simple compensation method by using light-load and heavy-load switch. The following three sections provide a detailed information on how to adjust the parameters

F70~F75or F229~F231 of the three startup compensating methods. In the absence of startup compensation, parameters F164 and F70~ F75 require no setting, and their default value 0 will be acceptable; the three parameters F229~F231 can also use their default values.

9.10.1 Startup Compensation Adjusting Method Using DTZZ-III-DC-SC Weighing Device (Set F164 as 0 or 3)

While using DTZZ-III-DC-SC model weighing device, the weighing data is sent to the control system in AS380S series AIO via CAN communications. Based on the values of the adjustment parameters F70~ F75, the control system calculates the final exact compensation data that is to be sent to the inverter in AIO; whereas the inverter makes the startup torque compensation directly based on this data. Therefore, it is enough to adjust only the parameters F70~ F75 in this case.

1. Self Learning of Weighing Device

In case of adjustment, set DTZZ-III-DC-SC model weighing device via Parameter F41, and carry out self learning. The meaning of parameter F41 is stated as follows:

Table 8.11: Meanings of Set Values of Parameter F41

F41 Values	Meanings
1	No-load self learning command and return data following successful no-load self learning
2	Full-load self learning command and return data following successful full-load learning
10	Command for setting of weighing device parameters and return data following successful self learning when activity of weighing device sensor is within the range of 0-10mm
20	Command for setting of weighing device parameters and return data following successful self learning when activity of weighing device sensor is within the range of 0-20mm
30	Command for setting of weighing device parameters and return data following successful self learning when activity of weighing device sensor is within the range of 0-30mm
40	Command for setting of weighing device parameters and return data following successful self learning when activity of weighing device sensor is within the range of 10mm-0
50	Command for setting of weighing device parameters and return data following successful self learning when activity of weighing device sensor is within the range of 20mm-0
60	Command for setting of weighing device parameters and return data following successful self learning when activity of weighing device sensor is within the range of 30mm-0

- Step 1: Set one correct data within 10-60 through F41 based on practical activity range of the device.
- Step 2: Empty the lift car load, and set F41 as 1; proceed with no-load self learning of weighing device; displayed value of F41 is 1 following successful self learning.
- Fully load the lift car, and set F41 as 2; proceed with full-load self learning of weighing device; displayed value of F41 is 1 following successful self learning.

2. Confirmation of Compensation Direction

After that, confirm if the compensation direction is correct: Let the elevator go upward with full

load from the bottom in inspection state. If increase of F72may alleviate the downward impact, or intensify the downward impact oscillation or enhance the downward impact oscillation when the lift car starts, it means that the compensation direction is correct; otherwise, it means the compensation direction is wrong. If wrong, change the value of Parameter F229 (from 0 to 1, or from 1 to 0).

It is applicable to adjust parameter F70-F75 once compensation direction is confirmed.

3. Set F40 value as per elevator balance coefficient

4. Adjust comfort with full load

1) Stop the elevator at the bottom floor, and switch over to inspection mode; let the elevator go upward. If down wash, reduce F72;if upward pull, increase the F72;

2) Stop the elevator between the bottom and the 2nd floor, switch over to inspection mode; let the elevator go downward. If down wash, reduce F73; if upward pull, increase the F73;

3) Stop the elevator at the top floor, switch over to the inspection mode; let the elevator go downward. If down wash, reduce F75; if upward pull, increase the F75.

5. Adjust comfort without load

1) Stop the elevator at the bottom floor, and switch over to inspection mode; let the elevator go upward. If down wash, reduce F70;if upward pull, increase the F70;

2) Stop the elevator between the bottom and the 2nd floor, switch over to inspection mode; let the elevator go downward. If down wash, reduce F71; if upward pull, increase the F71;

3) Stop the elevator at the top floor, switch over to the inspection mode; let the elevator go downward. If down wash, reduce F74; if upward pull, increase the F74.

6. Normally, it is no need to adjust F74 and F75 (unless the floors are extremely high or the weighing device's weighing values are inconsistent between the bottom floor and the top floor).

9.10.2 Method for adjustment of startup compensation using weighing device (set F164 as 1, 2, 5 or 6) other than DTZZ-III-DC-SC

When non-DTZZ-III-DC-SC model weighing device is chosen, its weighing data is sent to the control system in AS380S series AIO via CAN communications or analog signal input port. The control system sends this data directly to the inverter in AIO. Based on the adjustment of the three adjustment parameters F229 ~F231, the inverter calculates the final actual torque compensation value and makes startup compensation. Therefore, it is necessary to adjust the three parameters F229 ~ F231 in this case.

Firstly, adjust the compensation offset parameter F231. Load the lift car to the balance load, run the lift car to the middle position, and then confirm that the lift car is in complete balance with its counterweight (after power-off, with the brake released, the lift car can remain completely motionless). Set the inspection speed F12 as 0, and adjust the parameter F231 so that the elevator can remain completely motionless during inspection.

After that, confirm if the compensation direction is correct: Leave the no-loaded lift car stop at the leveling position of any floor in the middle, if the decrease of F230 (compensation gain) may reduce the upward impact oscillation of the lift car at start (slipping back upward when starting downward or rushing when starting upward), it means the compensation direction is correct; otherwise, it means the compensation direction is wrong. If wrong, change the value of Parameter F229 (from 0 to 1 or from 1 to 0)

Once the compensation direction is confirmed, adjust compensation gain parameter F230 finally.

Run the no-load lift car to the leveling position of the top floor, set the inspection speed (F12) to 0, and adjust the compensation gain parameter F230 (if the lift car moves upward at start, decrease this parameter; if downward, increase this parameter) until the lift car is not in full action when starting as the inspection mode.

9.10.3 Simple method for startup compensation using light-heavy load switch (set F164 as 4).

AS380S integrated elevator dedicated drive control cabinet adopts pre-load startup compensation with weighing device and another simple starting compensation: Use light-load and heavy-load switch. When this startup compensation is used, encoder can be 8192 pulse A, B, Z phase incremental encoder; furthermore, it does not need accurate weighing devices; it is only needed to install two micro-switches on the car bottom. For synchronous gearless tractor elevator, high resolution SIN / COS encoder is mandatory for non-weighing startup compensation mode. As compared with A, B, Z phase incremental encoder, SIN / COS Encoder is more expensive with more wiring and weaker anti-interference ability. Therefore, as compared with no weighing startup compensation mode, the light-load and heavy-load switch startup compensation is less expensive with less wiring and stronger anti-interference ability. As compared with pre-load starting compensation with analog signal input, it is less expensive and is easier for installation and simpler for commissioning due to the absence of an accurate weighing device. Therefore, we recommend that the light-load and heavy-load switch startup compensation mode is applicable to customers using AS380S series AIO.

When the light-load and heavy-load switch starting compensation mode is adopted, it is necessary to install a light-load and a heavy-load switch on the car bottom. We recommend that the light-load switch motions when the lift car load is less than 25% of the rated load, while the heavy-load switch motions when the lift car load is greater than 75% of the rated load. The light-load switch can be connected to JP6-02 (HX4) of (SM-02H) on the car top board, while the heavy-load switch can be connected to JP6-03 (HX5) terminal of (SM-02H) on the car top board.

1. **Set F40 value as per elevator balance coefficient**
2. **Adjust comfort with full load**

1) Stop the elevator at the bottom floor, and switch over to inspection mode; let the elevator go upward. If down wash, reduce F72;if upward pull, increase the F72;

2) Stop the elevator between the bottom and the 2nd floor, switch over to inspection mode; let the elevator go downward. If down wash, reduce F73; if upward pull, increase the F73;

3) Stop the elevator at the top floor, switch over to the inspection mode; let the elevator go downward. If down wash, reduce F75; if upward pull, increase the F75.

3. **Adjust comfort without load**

1) Stop the elevator at the bottom floor, and switch over to inspection mode; let the elevator go upward. If down wash, reduce F70;if upward pull, increase the F70;

2) Stop the elevator between the bottom and the 2nd floor, switch over to inspection mode; let the elevator go downward. If down wash, reduce F71; if upward pull, increase the F71;

3) Stop the elevator at the top floor, switch over to the inspection mode; let the elevator go downward. If down wash, reduce F74; if upward pull, increase the F74.

4. **Normally, it is no need to adjust F74 and F75** (unless the floors are extremely high or the

weighing device's weighing values are inconsistent between the bottom floor and the top floor).

9.11 UCMP test

1. UCMP parameter setting and parameter introduction

Handheld operator path -> value-added function ->UCM function ->UCM parameter setting
UCM uplink test
UCM downlink test
Brake test record

Parameter					
M0：UCM option					
		Synchronous motor		**Asynchronous motor**	
Bit	Explain	Default	Modifiable	Default	Modifiable
Bit0	Automatic brake force testing is allowed/forbidden	*	Y	-	N
Bit1	UCM contactor allows/disallows	-	Y	-	N
Bit2	UCM manual enable/disable	*	Y	*	Y
Bit3	UCM lock switch allows/disallows	*	Y	-	N
Bit4	UCM door locks are allowed/forbidden	-	Y	-	N
Bit5	UCMP fault detection allowed/forbidden	*	Y	*	Y
Bit6	Power on lock force allowed/forbidden	-	Y	-	N
M1: lock brake force manual test -- -m1 is 0 by default;Manual brake force test can only be carried out when M1=11					
M2: brake torque output duration -- -- -m2 is 5s by default;The M2 parameter setting range is 3-10s					
M3: number of lock arms -- set according to the on-site motor					
M4: rated elevator speed -- -- set according to the field speed					
M5: balance coefficient -- -- set according to the field balance coefficient					
M6: elevator rated load -- -- set according to the field rated load UCMP fault detection allowed/forbidden					

2. Synchronous motor UCMP field test (F202=1)

2.1 UCMP test mode

1. It needs to be confirmed that the door panel (sm.11 /A) and door area switch are available in advance.
2. In the menu of "UCM function", Bit5 of M0 "UCMP fault detection permission" is set to *;Bit2 "UCM manual" set to *.
3. Take the elevator to the appropriate floor and close the door (test position: the second floor on the top of no load in the upward test and the second floor on the bottom with full load in the downward test).

Notes:

1) when the elevator stops at the top floor and the door lock is closed automatically, select UCM uplink test prompt "please go to the middle floor"

2) when the elevator stops at the ground floor, the door lock will be closed automatically. Select UCM for downlink test.

4. In the value-added function -> UCM function, select the appropriate direction (UCM upper/lower test). If the door is not closed properly, it will be prompted in the test menu or try to close the door.

5. When the door is closed, "please cut off the lock" is prompted.Disconnect sm.11 /A car door lock connect A switch before detecting the contact input point to simulate disconnect the door lock.

6. When the simulated door lock is disconnected artificially, it is prompted to "press Enter to start the test". After pressing Enter, it is prompted to "test", and the elevator will automatically register the instruction to run on the nearest floor.The main board automatically outputs Klz, shortens the lock, registers an instruction in that direction (serviceable layer), and starts up.

7. The elevator operates with the door closed. After leaving the door area, open the door plate in advance to disconnect the door lock.

8. Measure cage position.

9. UCMP fault reset method: hold the upstroke and downstroke of maintenance for 5s at the same time under maintenance to reset UCMP fault.Note: the main board power off and then on, UCM fault maintenance, will not reset.

2.2 Synchronous motor manual brake force detection

1. Make sure the car is empty.

2. Turn the elevator to the maintenance state and drive to the top floor 2 without load.

3. Set M1 to 11.(using a handheld operator)

4. Press and hold the maintenance direction upward.

5. Kmy suction, the elevator to give the crawling speed.

6. First, the speed output is 0, and it stays at 3s (making the elevator stop and become static friction).In this period, if the displacement is found to be more than 10mm, 64 faults will be recorded and the locking force is seriously insufficient. If the displacement is less than 10mm, 65 faults will be recorded and the locking force is slightly insufficient.

7. Release Kmy and set M1 back to 0 automatically. At this time, the maintenance direction button can be released.

8. Check the test record (UCM function brake test record), you can know whether the test is successful (success: brake braking force is sufficient, failure: brake braking force is insufficient), if successful, the test is over.

9. If there is no. 64 fault, the lock should be repaired immediately and then reset through UCMP reset mode.If there is only no. 65 fault, it should be recorded and reported immediately, and the maintenance should be arranged as soon as possible.

Notes:

1. Press down direction, the elevator will not run.
2. The upper direction shall be released before the completion of the test, and the test shall be restarted next time according to the upper direction.
3. If the upper direction is not released, the test will stop automatically after completion, and the test will not run until the release direction is pressed again.
4. When the test is completed or automatic, M1 will automatically become 0.
5. Under the no. 65 fault, the status indicator light flashes double.

2.3 Automatic lock force detection of synchronous motor

1. M0 Bit0=1, Bit6=0: When the elevator meets the condition, it will enter the automatic braking force test.
2. After each power-on, the encoder angle is self-learned when it enters the fully automatic state for the first time, and the elevator is idle for 3 minutes, and the automatic test starts.
3. After entering the fully automatic state for the first time, and the elevator is not commanded for more than 3 minutes, the elevator will automatically close the door (if the door opening function is opened, the door will be closed first, and this phase will be invalid if the automatic return function is turned on.
4. The elevator automatically stops at the elevator, the door lock is closed, and the mainboard time is changed to 2016-6-21 02:59:59. When entering the 3 am, the elevator is in the automatic state and there is no order and external call registration. For the first time, it needs to exceed 3 Minutes (2016-6-2103:04:00), the door lock is closed, and the brake force is automatically tested. The M2 time is continued, the motor is not rotated, the torque is cut off, and the brake force automatic test is completed.
5. During the test, if there is an instruction and an outbound registration, the test is automatically canceled, and the next time the condition is met. If you go from automatic to overhaul or malfunction or power failure, it will not be tested automatically.

2.4 UCMP brake switch detection

1. M0: bit2, 3, 5=*, need UCMP reset
2. The elevator stops in the door area, and one of the KMB1 or KMB2 is disconnected. The elevator immediately reports 38# (the brake switch does not pick up), and the fault is reported after 3 times. The main interface of the operator prompts “UCMP fault protection”. In the maintenance state, press and hold the maintenance up and down button for more than 5s to clear the fault. The power can not be reset after the power is turned on or off.
3. When the elevator is running, short-circuit a brake switch detection point, elevator protection report 38#; after 5 attempts (record 5 38#), the main interface of the operator prompts “UCMP fault protection”, while holding down in the maintenance state Overhaul the up and down button for more

than 5 seconds to clear the fault, and the power can not be reset after the power is turned on or off.

2.5 UCMP brake switch and manual brake force detection

1. Set BIT2, BIT3, BIT5 to *.
2. Make sure the car is empty.
3. Move the elevator to the inspection state and unload it to the top 2nd floor.
4. Set M1 to 11. (using a handheld operator)
5. Press and hold the inspection direction.
6. Kmy pulls in and the elevator gives the crawling speed.
7. The speed output is 0 first and keeps it for 3s (so that the elevator stops and becomes static friction). The elevator gives the set torque and keeps the set time of M2. If the displacement is more than 10mm, the fault is recorded and the brake force is seriously insufficient. If the displacement does not exceed 10mm, record 65 fault, hold The brake force is slightly insufficient.
8. Release Kmy and automatically set M1 back to 0. At this point, the service direction button can be released.
9. Check the test record (monitoring status brake test record), you can know whether the test is successful (success: the brake braking force is sufficient, failure: the brake braking force is insufficient), if successful, the test ends.
10. If there is a fault No. 64, the brake should be repaired immediately and then reset by UCMP reset. If there is only fault 65, you should immediately report the report, arrange the repair as soon as possible, and reset the UCMP fault.
11. The elevator stops in the door area and manually disconnects one of KMB1 or KMB2. The elevator immediately reports 38# (the brake switch does not pick up) fault, and after 3 times, the fault is reported to death. The main interface of the operator prompts “UCMP fault protection”. In the maintenance state, press and hold the maintenance up and down button for more than 5s to clear the fault. The power can not be reset after the power is turned on or off.
12. When the elevator is running, short-circuit a brake switch detection point, elevator protection report 38#; after 5 attempts (record 5 38#), the main interface of the operator prompts “UCMP fault protection”, while in the maintenance state Press and hold the maintenance up and down button for more than 5 seconds to clear the fault. The power can not be reset after powering on or off.

3. UCMP field test of asynchronous motor (F202=0)

3.1 UCMP test mode

1. In the “UCM Function” menu, Bit5 “UCMP Detection Allowed” is set to

*; Bit2 is set to “UCM Manual” to *.

2. The elevator is opened to the appropriate floor and the door is closed (test position: the second layer of the empty top at the time of the upstream test and the second floor at the bottom of the full load test). Precautions:

   1) The elevator stops at the top floor, the automatic state, the door lock is closed, and the UCM uplink test prompt "Please open to the middle layer" is selected.

   2) The elevator stops at the bottom layer, the automatic state, the door lock is closed, and the UCM downlink test prompt "Please open to the middle layer" is selected.

3. In the value-added function -> UCM function, select the appropriate direction (UCM up/down test). If the door is not closed, you will be prompted in the test menu and try to close the door.
4. Disconnect the SM.11SF/A car door lock and touch a switch before the input point to simulate the disconnection.
5. Press Enter, the motherboard automatically outputs Klz, shorts the door lock, registers an instruction in the direction, and starts to start.
6. The elevator runs out of the door area, the door is unlocked in advance, and the elevator stops. If UCMP fault detection is enabled, there will be a UCMP fault record. Query the fault report 51#.
7. Measure the car position.
8. UCMP fault reset method: Under the inspection, press and hold the maintenance uplink and the maintenance downlink for 5s to reset the UCMP fault. Note: The main board is powered off and then powered on. The UCM fault remains and will not be reset.

3.2 expansion board

1. Target layer: When the elevator arrives at the landing floor or during maintenance, it will be disconnected at least until the door switch and the two level switches are out. Other conditions remain in the previous state.
2. UCM security: Elevator operation and non-UCMP test, and 2 levels are not output at the time, when the destination layer outputs and at least 1 level is not output. Other conditions remain in the previous state.
3. UCM fault: When a fault occurs, the UCMP reset mode can be released.

Notice to Customers

Dear customers:

RoHS is the abbreviation for *The restriction of the use of certain hazardous substances in electrical and electronic equipment* which was implemented by EU on July 1st, 2006. It stipulates that in the newly developed electrical and electronic equipment, the following six hazardous substances are restricted: lead, mercury, cadmium, hexavalent chrome, PBB and PBDE.

In China, *the Electronic Information Products Pollution Control Management Measures* was issued on February 28th, 2006 jointly by the Ministry of Information Industry, State Development and Reform Commission, Ministry of Commerce, General State Administration for Industry and Commerce, Administration of Customs of the P.R.C, General Administration of Quality Supervision, Inspection and Quarantine and State Bureau of Environmental Protection, became a RoHS direction of Chinese Version and was enforced. On February 1st, 2008, *electronic waste environmental pollution prevention and control management measures* issued by the State Bureau of Environmental Protection of the P.R.C began to be executed, clearly specifying that the users of electronic and electrical products shall provide or entrust the electronic waste to be disassembled and disposed by the qualified company (including small individual businesses) with corresponding business scope listed in directory (or temporary directory).

All electronic components, PCB filters, wire straps, structural parts used in our products are selected and purchased by following *the Electronic Information Products Pollution Control Management Measures* and RoHS directive. The six hazardous substances (lead, mercury, cadmium, hexavalent chrome, PBB and PBDE), are strictly controlled. During manufacturing PCB components are welded on a XinChi lead free welding production line with a lead free welding technology.

Hazardous substances may be contained in the following assemblies:

Type of assembly	Electronic components	PCB Board	Metal sheet	Radiator	Plastic piece	Conductor
Possible hazardous substances	Six hazardous substances: lead, mercury, cadmium, hexavalent chrome, PBB and PBDE					

1) Environment analysis: Our electronic products will produce some heat in operation, which may lead the spread of little amount of hazardous substances. It

will not cause any serious consequence for ambient environment. Once the life cycle of those electronic products is end and the product is discarded, the heavy metal and chemical hazardous substances contained in the products may seriously contaminate the soil and water resource.

2) Life cycle of electronic products and devices: Any electronic products and devices has its life cycle and will be discarded, replaced and upgraded by a new product, even it is still functional. The life cycle of our company electronic products is generally not more than 20 years.

3) Electronic products discard treatment: If the discarded electronic products aren't treated properly, it may contaminate the environment. Our customers are required to follow up the related national regulation and set up a reclaiming system. It can't be discarded as a regular household refuse or solid industrial wastes. The discarded products shall be stored in an environment-friendly way, or reclaimed by qualified company, and should be strictly complied with the *electronic waste environmental pollution prevention and control management measures* issued by the State Bureau of Environmental Protection of the P.R.C. Any unqualified individual or company is prohibited in disassembling, utilizing, disposing of electronic wastes.

Please don't throw away the electronic waste together with your ordinary domestic waste. Please call local waste disposing agencies or environment protection agencies for the advice of proper electronic waste handling.

Shanghai STEP Electric Corporation